

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-184106
(43)Date of publication of application : 09.07.1999

(51)Int.Cl. G03G 5/05
G03G 5/06
G03G 5/06
G03G 15/02

(21)Application number : 09-349853
(22)Date of filing : 18.12.1997

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(54) ELECTROPHOTOGRAPHIC PHOTORECEPTOR AND IMAGE FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an electrophotographic photoreceptor showing no environmental dependence, high photoelectric characteristics, mechanical strength, durability against oxidative gas, and durability against depositing matters such as paper powder, and excellent printing durability so that an image of high quality can be obtd. for a long time. and to provide an image forming device using this photoreceptor.

SOLUTION: In an electrophotographic photoreceptor having a photosensitive layer on a conductive base body, the photosensitive layer contains a compd. expressed by formula (I), a compd. containing fluorine atoms, and an antioxidant. In the formula, G is an inorg. vitreous network subgroup, D is a flexible org. subunit and F is a subunit having photoelectric characteristics.

G—D—F

LEGAL STATUS

[Date of request for examination] 06.12.1999

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3314702

[Date of registration] 07.06.2002

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]

[Claim 1] The electrophotography photo conductor characterized by containing the compound, fluorine atom content compound, and antioxidant as which a photosensitive layer is expressed in the following general formula (I) in the electrophotography photo conductor which has a photosensitive layer on a conductive base material.

[Formula 1]

G—D—F 一般式(I)

((An inorganic glassy network subgroup and D show a flexible organic subunit) As for F, the inside of a formula and G show a photoelectrical property subunit)

[Claim 2] The electrophotography photo conductor according to claim 1 characterized by the compound of the aforementioned general formula (I) forming the structure of cross linkage in a photosensitive layer.

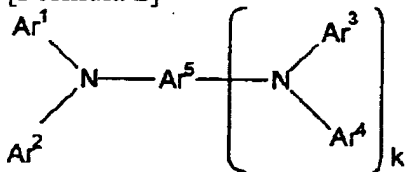
[Claim 3] The electrophotography photo conductor according to claim 1 or 2 characterized by the compound which the aforementioned fluorine content compound can join together through the inorganic glassy network subgroup expressed with the compound of a general formula (I) and G, and is expressed with a general formula (I), and the fluorine content compound forming the structure of cross linkage in a photosensitive layer.

[Claim 4] An electrophotography photo conductor given in the claim 1 to which the layer containing the compound, fluorine atom content compound, and antioxidant which are expressed with the aforementioned general formula (I) is characterized by being shown in the maximum front face of a photosensitive layer, or any 1 term of 3.

[Claim 5] An electrophotography photo conductor given in the claim 1 or any 1 term of 4 characterized by containing the aforementioned antioxidant also in the layer which does not contain a front pan **** compound by the general formula (I).

[Claim 6] An electrophotography photo conductor given in the claim 1 characterized by the compound expressed with the aforementioned general formula (I) being a compound expressed with the following general formula (II), or any 1 term of 5.

[Formula 2]



一般式(II)

(Among a formula, Ar¹ -Ar⁴ expresses independently the aryl group which is not replaced [substitution or], respectively, Ar⁵ expresses the aryl group or arylene machine which is not replaced [substitution or], and 1-4 in Ar¹ -Ar⁵ have the substituent expressed with G-D-, and k expresses 0 or 1.)

[Claim 7] An electrophotography photo conductor given in the claim 1 to which G-D- in the compound expressed with the aforementioned general formula (I) is characterized by what is expressed with the following general formula (III), or any 1 term of 6.

[Formula 3]

—Y—Si (R¹)_(3-a) (OR²)_a 一般式(III)

(R¹ expresses among a formula the aryl group which is not replaced [hydrogen, an alkyl group, substitution, or], R² expresses hydrogen, an alkyl group, and a trialkylsilyl group, a expresses the integer of 1-3, and Y shows the divalent

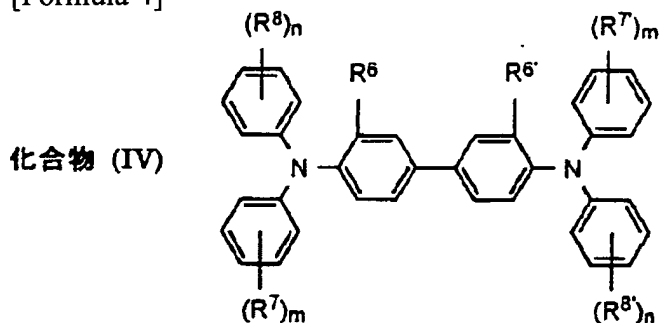
basis which does not contain the hydrogen atom coupled directly with the hetero atom.)

[Claim 8] The electrophotography photo conductor of a claim 7 characterized by the following. Y in the aforementioned general formula (III) is $-C_x H_{2x}$. - (x expresses the integer of 1-15.) $-C_{x'} H_{2x'}-2-$ (x' expresses integer of 2-15.), $-C_{x''} H_{2x''}-4-$ (x'' expresses the integer of 2-15.) At least one or more sorts chosen from the group which consists of the divalent aryl group which is not replaced [substitution or], $-CH=N-$, $-O-$, and $-COO-$. And the divalent basis which does not contain the hydrogen atom coupled directly with the hetero atom.

[Claim 9] the aforementioned photosensitive layer -- a gallium-halide phthalocyanine or a hydroxy gallium phthalocyanine, an oxy-titanium phthalocyanine, and a halogenation tin phthalocyanine -- since -- an electrophotography photo conductor given in the claim 1 characterized by containing at least one or more sorts in the group chosen, or any 1 term of 8

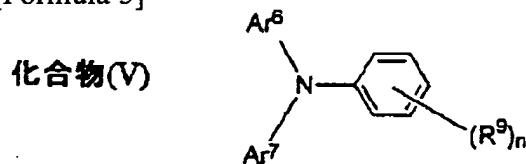
[Claim 10] An electrophotography photo conductor given in the claim 1 characterized by the aforementioned photosensitive layer containing one or more sorts chosen from the triaryl amine system compound expressed with the benzidine system compound and the following general formula (V) which are expressed with the following general formula (IV), or any 1 term of 9.

[Formula 4]



(Among the formula, a hydrogen atom, a halogen atom, the alkyl group of carbon numbers 1-5, and a carbon number express the alkoxy group of 1-5, and R^6 and $R^{6'}$ may be the same, and may differ from each other.) R^7 , R^7' , and the substitution amino group by which R^8 and $R^{8'}$ were replaced by a hydrogen atom, the halogen atom, the alkyl group of carbon numbers 1-5, the alkoxy group of carbon numbers 1-5, and the alkyl group of carbon numbers 1-2 are expressed, and it may be the same and you may differ. m and n express the integer of 0-2.

[Formula 5]



(R^9 expresses a hydrogen atom or a methyl group among a formula, and n expresses 1 or 2.) Ar^6 And Ar^7 The aryl group which is not replaced [substitution or] is expressed and a halogen atom, the alkyl group of carbon numbers 1-5, and the substitution amino group by which the carbon number was replaced by the alkoxy group of 1-5 and the alkyl group of carbon numbers 1-2 are expressed as this substituent.

[Claim 11] Electrophotography image formation equipment characterized by for this electrophotography photo conductor being an electrophotography photo conductor given in a claim 1 or any 1 term of 10, and an electrification means being a contact electrification method in an electrophotography photo conductor and the electrophotography image formation equipment which has a cleaning means mechanical in the electrification means row at least.

[Claim 12] Electrophotography image formation equipment according to claim 11 characterized by the electrification voltage used for the aforementioned contact electrification method having an alternating current component.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to electrophotography photo conductors applied to a latus field, such as a copying machine, a printer, and facsimile, the manufacture method of those, and the electrophotography image formation equipment using it.

[0002]

[Description of the Prior Art] Conventionally, with the application of the imaging process of electrification, exposure, and development, image formation of electrophotography equipment (PPC), for example, a plain paper copier, a LASER beam printer, an LED printer, the liquid crystal printer, etc. is carried out to photo conductors, such as a rotating-drum type, they are established after imprinting to imprint material, and obtain a duplication. Although inorganic system photo conductors, such as a selenium, an arsenic-selenium, a cadmium sulfide, a zinc oxide, and a-Si, are used as a photo conductor used for these It is cheap and the research and development of an organic photo conductor (OPC) which were excellent in respect of manufacturability and abandonment nature are also activated. The so-called functional discrete-type laminating photo conductor which carried out the laminating of a charge generating layer and the charge transporting bed is excellent especially in respect of electrophotography properties, such as sensitivity, electrification nature, and its repeat stability, and various proposals are made and put in practical use.

[0003] However, the endurance required of an electrophotography photo conductor is severe every year, and examination of technology required for the improvement in endurance is continued to problems, such as oxidization degradation of the surface layer by oxidizing gases, such as ozone generated from wear and the blemish of the surface layer puffed up remarkably, and a corona-electrical-charging machine, by the use under wear and the blemish of the surface layer by repeat use, especially contact electrification.

[0004] Recently comes, and generating of a oxidizing gas decreases, and the copying machines and printers using the contact electrification method are increasing in number from the reasons of power supply cost being held down. However, in order to stabilize the electrification potential of a photo conductor, when the applied voltage which has an alternating current component was used, there was a problem that wear on the front face of a photo conductor will become large. It considers that combination of the binding resin on the front face of a photo conductor is cut by the electric discharge generated between a photo conductor front face and zone-of-contact electrical machinery, and carries out low-molecular quantification by it as this cause etc. If the binding resin on the front face of a photo conductor carries out low-molecular quantification, when mechanical cleaning of a cleaning blade etc. is being performed, it turns out that wear increases remarkably.

[0005] As a method of reducing wear of a photo conductor, the thing of giving the high surface-protection layer of a mechanical strength is shown in a photo conductor front face. Although the bridge formation hardenability resin was excellent from the field of a mechanical strength, when constituted only from a cross-linking resin, since a surface-protection layer turned into an insulating layer, the photoelectrical property as a photo conductor had fallen victim. Specifically, when the bright section potential at the time of exposure rose, and the problem to which a development potential margin becomes narrow, and the rest potential after electric discharge went up, and long-term copy printing was performed especially, there was a problem to which picture concentration falls.

[0006] The method of distributing in a surface-protection layer as the technique of giving a photoelectrical property by making a conductive metallic-oxide impalpable powder into rheostatic control material is reported (JP,57-128344,A). The fall of the photo conductor photoelectrical property by this method is small, and the problem raised above improves notably. However, the resistance of the metallic oxide generally used as a conductive impalpable powder has the problem of being greatly dependent on environmental humidity. For the reason, there was an essential problem that photo conductor surface electrical resistance will fall to the bottom of high-humidity/temperature, and picture grace

will fall greatly when an electrostatic latent image fades.

[0007] The method of distributing the charge transportation matter, stiffening a binding resin after that, and forming a surface-protection layer into a binding resin, as other technique of improving a photoelectrical property, is reported (JP,4-15659,A). There was no problem on picture grace without photo conductor surface electrical resistance showing humidity dependence by this method. However, addition of a low molecular weight constituent called the charge transportation matter checks a hardening reaction, and reduces the mechanical strength of a surface-protection layer. Therefore, the mechanical strength of a surface-protection layer had the trouble of falling greatly, by adding a low-molecular component called the indispensable charge transportation matter though the high bridge formation hardenability resin of a mechanical strength is used, if independent to improvement of a photoelectrical property.

[0008] The report of measuring improvement in the mechanical strength of a surface layer is carried out by making this react with a thermoplastic binding resin from such a viewpoint using the charge transportation matter which has a functional group. (JP,6-202354,A, JP,5-323630,A) . According to this method, sufficient mechanical strength can be obtained in first stage, without reducing the photoelectrical property of a photo conductor. However, with these surface-layer composition, when used under contact electrification for a long period of time, there was a trouble that the rapid fall of a mechanical strength took place. It is thought that this cause is what is depended on a strong external stress called cutting of combination of the thermoplastic binding resin by the alternating-voltage impression in contact electrification too, and if mechanical cleaning of a cleaning blade etc. is used, wear will increase very much.

[0009] In addition to the problem of wear of a photo conductor, the resistance over a oxidizing gas is also required. Namely, ozone and NOx which will be generated compared with scorotron electric discharge if a contact electrification method is used Although there are few amounts far, in using the applied voltage which has an alternating current component, these oxidizing gases surely occur. When it is going to prolong a life by raising the mechanical strength on the front face of a photo conductor, in order that the oxidizing gas which occurred may affect a long time photo conductor, the resistance over the oxidizing gas more than before is searched for.

[0010] Furthermore, if it is going to raise only the mechanical strength of a surface-protection layer in addition to these troubles, paper powder and a toner will become easy to adhere to a photo conductor front face, and the problem of as a result reducing picture quality will also arise.

[0011]

[Problem(s) to be Solved by the Invention] The purpose of this invention does not have an environmental dependency and the resistance over affixes, such as a photoelectrical property, a mechanical strength, resistance over a oxidizing gas, and paper powder, etc. is offering the electrophotography photo conductor excellent in the print durability which can continue a quality picture for a long period of time highly, and the image formation equipment which used it for the row.

[0012]

[Means for Solving the Problem] This invention persons found out that the above-mentioned problem was solvable by making the compound, fluorine atom content compound, and antioxidant which are expressed with the following general formula (I) in a photosensitive layer contain. When this photo conductor is especially used for a contact electrification method and the electrophotography image formation equipment which has a mechanical cleaning means, print durability can be raised by leaps and bounds.

[0013]

[Formula 6]

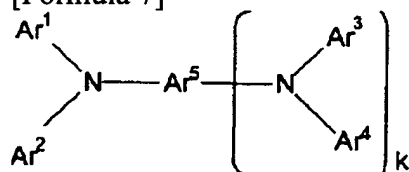
G—D—F 一般式(I)

[0014] (The inside of a formula and G are [a flexible organic subunit and F of an inorganic glassy network subgroup and D] photoelectrical property subunits)

[0015] It is desirable that the compound expressed with a general formula (I) is a compound expressed with the following general formula (II).

[0016]

[Formula 7]



一般式(II)

[0017] The inside of a general formula (II), and Ar1 -Ar4 The aryl group which is not replaced [substitution or] is expressed independently, respectively, and it is Ar5. The aryl group or arylene machine which is not replaced [substitution or] is expressed, and it is Ar1 -Ar5. 1-4 pieces have the substituent expressed with G-D- inside, and k expresses 0 or 1.

[0018] Moreover, as a desirable gestalt, it is suitable that the compound of the aforementioned general formula (I) forms the structure of cross linkage in a photosensitive layer, and it is desirable that the compound which the aforementioned fluorine content compound can join together through the inorganic glassy network subgroup expressed with the compound of a general formula (I) and G, and is expressed with a general formula (I), and the fluorine content compound form the structure of cross linkage in a photosensitive layer.

[0019] Furthermore, it is desirable that the layer containing the compound, fluorine atom content compound, and antioxidant which are expressed with the aforementioned general formula (I) is a layer in the maximum front face of a photosensitive layer, and it is desirable that the aforementioned antioxidant contains also in the layer which does not contain a front pan **** compound by the general formula (I).

[0020]

[Embodiments of the Invention] Hereafter, the electrophotography photo conductor of this invention is explained in detail. The electrophotography photo conductor of this invention has a photosensitive layer at least on a conductive base material, and has the layer of others, such as an under-coating layer and a protective layer, if needed.

[0021] (Conductive base material) As a conductive base material which can be used for this invention, if generally used as a conductive base material of an electrophotography photo conductor, paper, plastic film, etc. which the plastic film which especially a limit does not have, for example, prepared thin films, such as metals, such as aluminum, nickel, chromium, and stainless steel, aluminum, titanium, nickel, chromium, stainless steel, gold, vanadium, a tin oxide, indium oxide, and ITO, and conductive grant agent be made to apply or ***** will mentioned

[0022] Various kinds of processings etc. can be performed in the aforementioned conductive base material if needed in the range which does not have influence in quality of image. As such processing, irregular reflection processing of anodized coating processing of the front face of the aforementioned conductive base material, hot water oxidation treatment, a chemical treatment, coloring processing, graining, etc. is mentioned, for example. As a configuration of the aforementioned conductive base material, there is especially no limit, and it can be suitably chosen according to the purpose, for example, the shape of the shape of the shape of a drum and a sheet and a plate etc. is mentioned.

[0023] (Under-coating layer) Although a photosensitive layer is prepared in one front face of the aforementioned conductive base material, in this invention, an under-coating layer can be suitably prepared between this conductive base material and this photosensitive layer. It is advantageous at the point which can show a reflected light prevention operation of the light of this conductive base material etc. depending on the operation or ** as a glue line which pastes up ** in one to this conductive base material, and makes this photosensitive layer hold to it when this undercoating layer prevents pouring of the charge to the aforementioned photosensitive layer from the aforementioned conductive base material at the time of electrification of the aforementioned photosensitive layer, and the case if the aforementioned under-coating layer is prepared in the electrophotography photo conductor.

[0024] As the aforementioned undercoating layer, it can form with the quality of the material generally used for the under-coating layer of an electrophotography photo conductor, for example, comes [at least] to contain a particle etc. if needed further coming [a binding resin]. Although there is especially no limit and it can choose suitably as the aforementioned binding resin according to the purpose For example, polyamide resin, vinyl chloride resin, a vinyl acetate resin, phenol resin, A polyurethane resin, melamine resin, a benzoguanamine resin, polyimide resin, A polyethylene resin, polypropylene resin, polycarbonate resin, acrylic resin, Methacrylic resin, a vinylidene chloride resin, a polyvinyl-acetal resin, A vinyl chloride vinyl acetate copolymer, a polyvinyl alcohol resin, water-soluble polyester resin, A nitrocellulose, casein, gelatin, poly glutamic acid, starch, Starch acetate, amino starch, a polyacrylic acid, a polyacrylamide, a zirconium chelate compound, a titanyl chelate compound, a titanyl alkoxide compound, an organic titanyl compound, a silane coupling agent, etc. are mentioned. These may be used by the one-sort independent and may use two or more sorts together. As the aforementioned particle, titanium oxide, an aluminum oxide, oxidization silicon, a zirconium oxide, a barium titanate, silicone resin, etc. are mentioned, for example. These may be used by the one-sort independent and may use two or more sorts together.

[0025] As the method of application at the time of forming the aforementioned undercoating layer, although there is especially no limit, the usual methods of application, such as the blade coating method, the MAIYA bar coating method, the spray coating method, a dip coating method, the bead coating method, the air-knife-coating method, and the curtain coating method, are mentioned, for example. As thickness of the aforementioned undercoating layer, usually, it is 0.01-10 micrometers and 0.05-2 micrometers is desirable.

[0026] (Photosensitive layer) The electrophotography photo conductor of this invention comes to prepare a

photosensitive layer on a conductive base material, and contains the compound, fluorine atom content compound, and antioxidant as which this photosensitive layer is expressed in the following general formula (I). This photosensitive layer You may be a monolayer type and may be the laminating type by which functional separation was carried out at the charge generating layer, the charge transporting bed, etc.

[0027]

[Formula 8]

G — D — F 一般式 (I)

[0028] G expresses an inorganic glassy network subgroup among a general formula (I). An inorganic glassy network subgroup has combination of a metallic oxide, with the reaction machine of an end, repeats other inorganic glassy network subgroups and combination, and can form an inorganic glassy network. Specifically obtaining from an alkoxide, an acid, and the arbitrary mineral matters that can receive hydrolysis and condensation like a chloride can introduce because **** uses the compound which has an about one to 20-carbon number alkoxide, or an aryl oxide machine in atoms, such as Si, aluminum, Ti, Cu, Fe, As, Se, and Te, preferably. moreover, the compounds which can combine through the inorganic glassy network subgroup expressed with G in the compound expressed with a general formula (I) may be other compounds which it may be chosen from the compound expressed with another general formula (I) which may differ even if the same as the compound to combine, and can combine with the inorganic glassy network subgroup only expressed with G in the compound expressed with a general formula (I) A well-known organometallic compound can be used as other compounds which can be combined here, and organoaluminium compounds, such as organic titanium compounds, such as organic zirconium compounds, such as a zirconium chelate compound, a zirconium-alkoxide compound, and a zirconium coupling agent, a titanium chelate compound, a titanium alkoxide compound, and a titanate coupling agent, an aluminum chelate compound, and an aluminum coupling agent, an aluminum silicon alkoxide, an aluminum titanium alkoxide, etc. are mentioned. Moreover, silane coupling agents, such as a vinyl trichlorosilane, vinyltrimetoxysilane, a vinyl tris-2-methoxyethoxy silane, vinyltriacetoxysilane, gamma-glycidyl SHIKIPURO pill trimethoxysilane, gamma-methacryloxypropyl trimethoxy silane, and gamma-aminopropyl triethoxysilane, can also be used preferably, and these can be suitably chosen, in order to acquire the property of a desired photosensitive layer.

[0029] When the compounds expressed with a general formula (I) form a part of structure of cross linkage [at least] in a photosensitive layer through the inorganic glassy network subgroup expressed with G, the binding energy in a unit volume becomes large, and the resistance over strong stress, such as electric discharge and mechanical contact, becomes high. Furthermore, it becomes, without not carrying out low-molecular quantification immediately and therefore losing a mechanical strength immediately, since the structure of cross linkage is formed, though a part of combination should be cut by such stress.

[0030] D expresses a flexible organic subunit among a general formula (I). A flexible organic subunit is the connection section for combining the photoelectrical property subunit expressed with the inorganic glassy network subgroup expressed with G which forms the structure of cross linkage, and F. Specifically, it is -C_nH_{2n}. - (n expresses the integer of 1-15.) -C_nH_{2n'}-2- (n' expresses the integer of 2-15.) -C_nH_{2n''}-4- (n'' expresses the integer of 2-15.) What introduced -COO-, -S-, -O-, -CH₂-C₆H₄-, -CH=N-, -(C₆H₄)-(C₆H₄)-, or these combination and substituents is expressed.

[0031] F expresses a photoelectrical property subunit among a general formula (I). A photoelectrical property subunit is a unit which has optical carrier transport properties as mentioned above, and the structure known as charge transportation matter can be used as it is conventionally. the skeleton of a compound which specifically has electron hole transportability, such as a triaryl amine system compound, a benzine system compound, an aryl alkane system compound, an aryl substitution ethylene system compound, a stilbene system compound, an anthracene system compound, and a hydrazone system compound, and a quinone system compound, and full -- me -- non, the skeleton of a compound which has electronic transportability, such as a system compound, a xanthone system compound, a benzophenone system compound, a cyano vinyl system compound, and an ethylene system In the photo conductor of this invention, the compound expressed with a general formula (I) has the photoelectrical property subunit expressed with F, and it becomes possible to give a photoelectrical property, without losing the mechanical-strength property of the structure of cross linkage, since this couples directly with the at least 1 section of the structure of cross linkage through the inorganic glassy network subgroup expressed with G preferably. That is, the layer containing the compound expressed with a general formula (I) is not only usable as a surface-protection layer on the front face of a photo conductor, but can function as a charge transporting bed of a laminating type photo conductor from the mechanical property.

[0032] In addition to the property of a compound expressed with the above-mentioned general formula (I), this

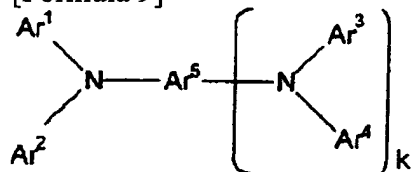
invention can raise oxidation resistance by the antioxidizing effect of an antioxidant by adding an antioxidant. Moreover, the adhesion-proof of a photo conductor can be raised by lubricity, low adhesion, etc. which a fluorine content compound has by addition of a fluorine content compound.

[0033] In this invention, it uses in the meaning called the group or unit which constitutes the compound expressed with a general formula (I) with the "factice" of an inorganic glassy network subgroup, a flexible organic subunit, and a photoelectrical property subunit.

[0034] In this invention, it is desirable that the compound expressed with the general formula (I) used for a photosensitive layer is a compound expressed with the following general formula (II).

[0035]

[Formula 9]



一般式(II)

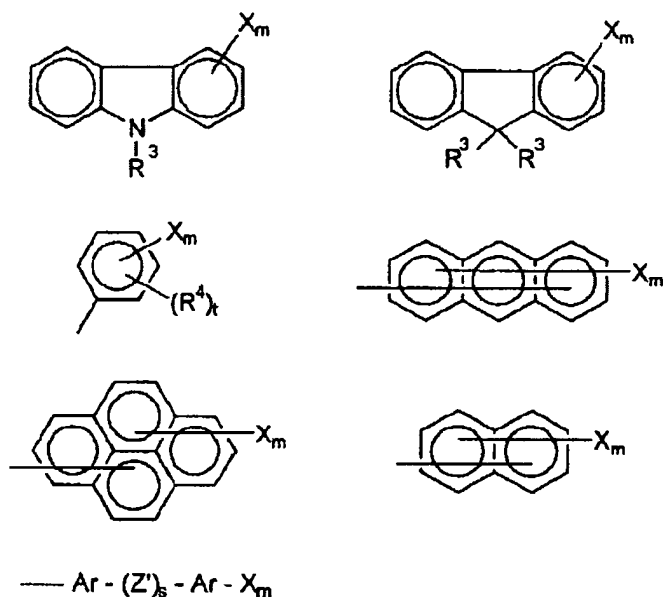
[0036] The inside of a general formula (II), and Ar1 -Ar5 The aryl group which is not replaced [substitution or] is expressed independently, respectively, and it is Ar5. The aryl group or arylene machine which is not replaced [substitution or] is expressed, and it is Ar1 -Ar5. 1-4 pieces have the substituent expressed with G-D- inside, and k expresses 0 or 1.

[0037] General formula (II) Inside and Ar1 -Ar4 The aryl group which is not replaced [substitution or] is shown independently, respectively, and, specifically, the basis shown in the following structure group 1 is mentioned.

[0038]

[Formula 10]

構造群1



[0039] The inside of the structure expression of a structure group 1, and R3 Hydrogen, the alkyl group of carbon numbers 1-4, the phenyl group replaced by the alkyl group of carbon numbers 1-4, or the alkoxy group of carbon numbers 1-4 or a non-replaced phenyl group, and the aralkyl machine of carbon numbers 7-10 -- expressing -- R4 Hydrogen, the alkyl group of carbon numbers 1-4, the alkoxy group of carbon numbers 1-4, or a halogen is expressed, m and s express 0 or 1, and t expresses the integer of 1 to 3. Z' is chosen from the basis shown in the following structure group 2.

[0040]

[Formula 11]

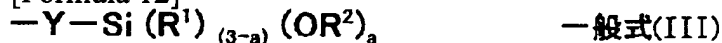
構造群2



[0041] Among the structure expression of a structure group 1, X is a substituent expressed with G-D- and its substituent expressed with the following general formula (III) is desirable.

[0042]

[Formula 12]

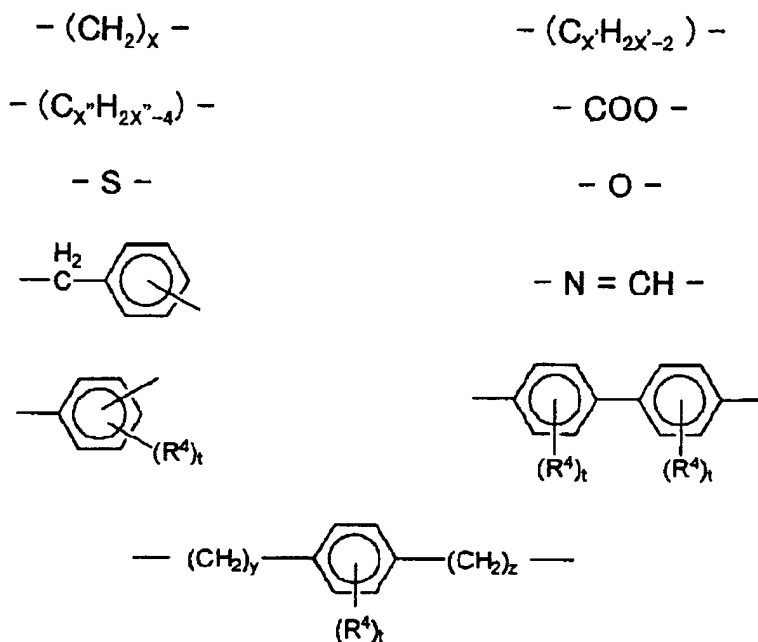


[0043] The inside of a general formula (III), and R1 The aryl group which is not replaced [hydrogen, an alkyl group, substitution, or] is expressed, and it is R2. Hydrogen, an alkyl group, and a trialkylsilyl group are expressed, a expresses the integer of 1-3, and Y expresses the divalent basis which does not contain the hydrogen atom coupled directly with the hetero atom. As an example of Y, the basis shown in the following structure group 3 is mentioned.

[0044]

[Formula 13]

構造群3



[0045] In the inside of the structure expression of a structure group 3, and x, the integer, x', and x'' of 1-10 express the integer of 2-15, and y and z express the integer of 1-5, respectively. The basis shown in the following structure expression 4 also especially in this is desirable.

[0046]

[Formula 14]

構造群4



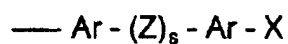
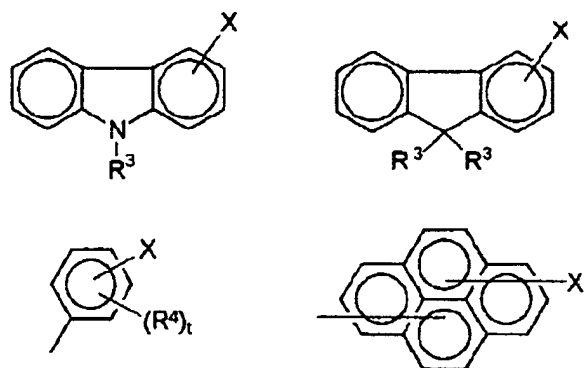
[0047] The inside of a general formula (II), and Ar5 The aryl group or arylene machine which is not replaced

[substitution or] is expressed, and, specifically, the basis at the time of $k=0$ shown in the following structure expression 5 is mentioned.

[0048]

[Formula 15]

構造群5

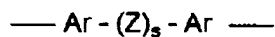
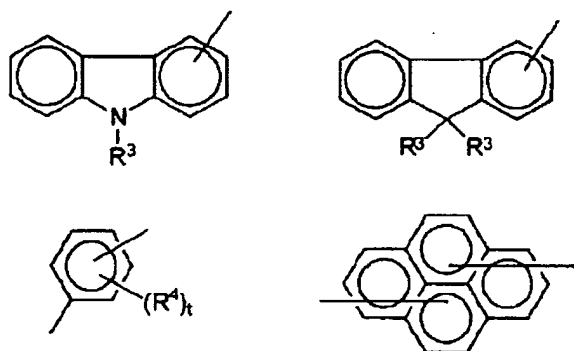


[0049] Moreover, general formula Ar5 at the time of $k=1$ among (II) Specifically, the basis shown in the following structure group 6 is mentioned.

[0050]

[Formula 16]

構造群6

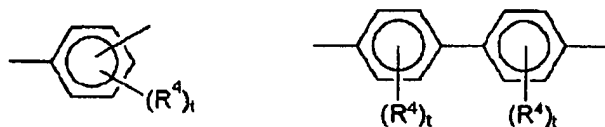


[0051] Ar is chosen from the basis shown in the following structure expression 7 among the structure expression of structure groups 5 and 6.

[0052]

[Formula 17]

構造群7

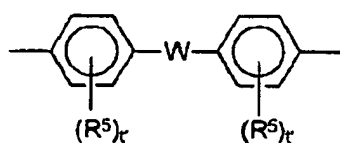
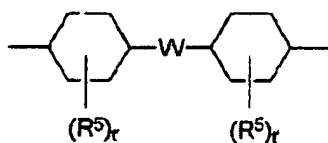
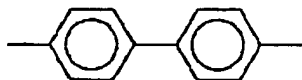
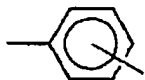
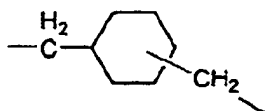
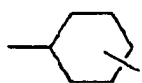
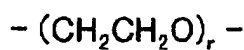
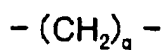


[0053] Moreover, Z is chosen from the basis shown in the following structure group 8.

[0054]

[Formula 18]

構造群8

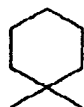
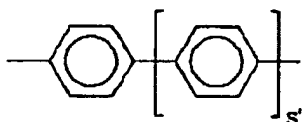
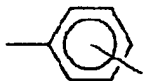
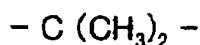


[0055] The inside of the structure expression of a structure group 8, and R5 It is chosen from hydrogen, the alkyl group of carbon numbers 1-4, the alkoxy group of carbon numbers 1-4, and a halogen. Moreover, in q and r, the integer of 1-10 and t' show the integer of 1 or 2, respectively, and W is chosen from the basis shown in the following structure group 9.

[0056]

[Formula 19]

構造群9













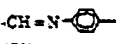



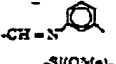

















[0057] s' expresses the integer of 0-3 among the structure expression of a structure group 9.



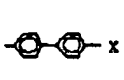


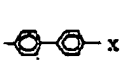


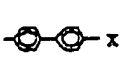


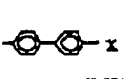


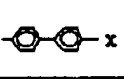


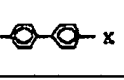


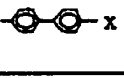


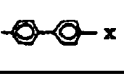


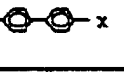
[0058] Although mentioned by showing a concrete functional group [in / a general formula (I) / for the instantiation compound of a general formula (I), and "a compound 1 - a compound 256"] in following Tables 1-25, this invention is not restricted to these.

[0059]

[Table 1]




























化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
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2	0			—	—		-CH=N-(CH ₂) ₃ -Si(OMe) ₃
3	0			—	—		-CH=N-(CH ₂) ₃ -Si(OEt) ₃
4	0			—	—		-CH=N-  (CH ₂) ₃ -Si(OMe) ₃
5	0			—	—		-CH=N-  -Si(OMe) ₃
6	0			—	—		-O-(CH ₂) ₃ -Si(OMe) ₃
7	0			—	—		-O-(CH ₂) ₃ -SiMe ₂ (OMe) ₂
8	0			—	—		-O-(CH ₂) ₃ -Si(OEt) ₃
9	0			—	—		-CH ₂ -O-(CH ₂) ₃ -Si(OMe) ₃
10	0			—	—		-(CH ₂) ₃ -O-(CH ₂) ₃ -Si(OMe) ₃

[0060]
[Table 2]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
11	0			—	—		$-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
12	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
13	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
14	0			—	—		$-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
15	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
16	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
17	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
18	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
19	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$















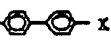


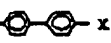


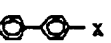


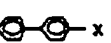
[0061]

[Table 3]


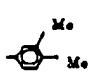


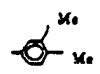


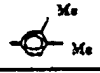


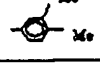


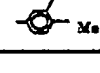


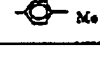



















化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
20	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
21	0			—	—		$-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
22	0			—	—		$-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
23	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
24	0			—	—		$-\text{CH}_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
25	0			—	—		$-\text{CH}_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
26	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
27	0			—	—		$-(\text{CH}_2)_7-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
28	0			—	—		$-(\text{CH}_2)_7-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$

[0062]

[Table 4]




























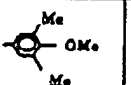


化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
29	0			—	—		-COO-(CH ₂) ₇ - Si(OMe) ₃
30	0			—	—		-COO-CH ₂ C ₆ H ₄ - (CH ₂) ₇ -Si(OMe) ₃
31	0			—	—		(CH ₂) ₇ -COO- (CH ₂) ₇ -Si(OMe) ₃
32	0			—	—		(CH ₂) ₇ -COO- CH ₂ C ₆ H ₄ -(CH ₂) ₇ - Si(OMe) ₃
33	0			—	—		-COO-(CH ₂) ₇ - Si(OMe) ₃
34	0			—	—		-COO-CH ₂ - C ₆ H ₄ -Si(OMe) ₃
35	0			—	—		-COO-(CH ₂) ₇ - Si(OMe) ₃
36	0			—	—		-COO-(CH ₂) ₇ - Si(OMe) ₃

[0063]
[Table 5]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
37	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
38	0			—	—		$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
39	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
40	0			—	—		$-\text{CH}_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
41	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
42	0			—	—		$-(\text{CH}_2)_7-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
43	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
44	0			—	—		$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
45	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
46	0			—	—		$-\text{CH}_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
47	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
48	0			—	—		$-(\text{CH}_2)_7-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$































[0064]

[Table 6]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
49	0			—	—		$-\text{CH}=\text{CH}-\text{Si}(\text{OEt})_3$
50	0			—	—		$-\text{CH}=\text{CH}-\text{CH}_2-\text{Si}(\text{OEt})_3$
51	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
52	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{SiMe}(\text{OMe})_2$
53	0			—	—		$-\text{CH}=\text{CH}-\text{CH}_2-\text{Si}(\text{OMe})_2\text{Me}$
54	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_3-\text{Si}(\text{OEt})_3$
55	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_{10}-\text{Si}(\text{OMe})_3$
56	0			—	—		$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
57	0			—	—		$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
58	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$





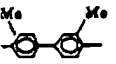









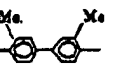














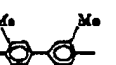




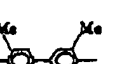









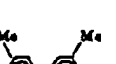





[0065]

[Table 7]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
59	0			—	—		$-(CH_2)_7-Si(OEt)_3$
60	0			—	—		$-(CH_2)_7-Si(OEt)_3$
61	0			—	—		$-(CH_2)_7-Si(OMe)_3$
62	0			—	—		$-(CH_2)_7-SiMe_2(OMe)_2$
63	0			—	—		$-(CH_2)_7-SiMe_2(OMe)_2$
64	0			—	—		$-(CH_2)_7-Si(OEt)_3$
65	0			—	—		$-(CH_2)_7-SiMe_2(OEt)_2$
66	0			—	—		$-(CH_2)_7-Si(OMe)_3$
67	0			—	—		$-(CH_2)_7-C_6H_4--(CH_2)_7-Si(OMe)_3$
68	0			—	—		$-CH_2-CH_2-C_6H_4--Si(OMe)_3$





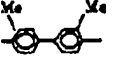




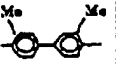




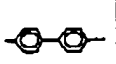
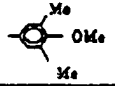


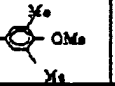
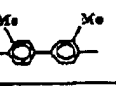
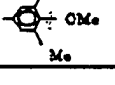


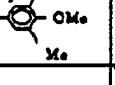
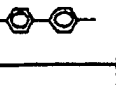




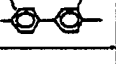




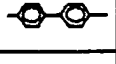
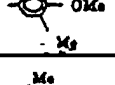


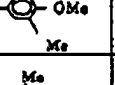
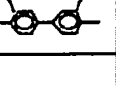



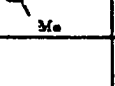
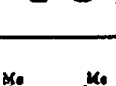




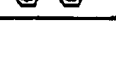
[0066]

[Table 8]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
69	1						$\text{-CH=N(CH}_2\text{)}_2\text{-Si(OMe)}_3$
70	1						$\text{-CH=N(CH}_2\text{)}_2\text{-Si(OMe)}_3$
71	1						$\text{-CH=N(CH}_2\text{)}_2\text{-Si(OMe)}_3$
72	1						$\text{-CH=N(CH}_2\text{)}_2\text{-Si(OMe)}_3$
73	1						$\text{-CH=N(CH}_2\text{)}_2\text{-Si(OMe)}_3$
74	1						$\text{-CH=N(CH}_2\text{)}_2\text{-Si(OMe)}_3$
75	1						$\text{-O(CH}_2\text{)}_2\text{-Si(OMe)}_3$
76	1						$\text{-O(CH}_2\text{)}_2\text{-Si(OMe)}_3$
77	1						$\text{-CH}_2\text{-O(CH}_2\text{)}_2\text{-Si(OMe)}_3$
78	1						$\text{-(CH}_2\text{)}_2\text{-O(CH}_2\text{)}_2\text{-Si(OMe)}_3$































[0067]

[Table 9]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
79	1						$-(CH_2)_4-Si(OMe)_3$
80	1						$-(CH_2)_7-C_6H_4-Si(OMe)_3$
81	1						$-(CH_2)_4-Si(OMe)_3$
82	1						$-(CH_2)_4-Si(OMe)_3$
83	1						$-(CH_2)_4-Si(OMe)_3$
84	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
85	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
86	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
87	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
88	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$































[0068]

[Table 10]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
89	0			—	—		$-(CH_2)_7-Si(OEt)_2$
90	0			—	—		$-(CH_2)_7-Si(OEt)_2$
91	0			—	—		$-(CH_2)_7-Si(OMe)_2Me$
92	0			—	—		$-(CH_2)_7-Si(OMe)_2$
93	0			—	—		$-(CH_2)_7-Si(OMe)_2$
94	0			—	—		$-(CH_2)_7-Si(OEt)_2$
95	0			—	—		$-(CH_2)_7-C_6H_4-Si(OMe)_2$
96	0			—	—		$-(CH_2)_7-C_6H_4-Si(OMe)_2$ $-(CH_2)_7-Si(OMe)_2$
97	0			—	—		$-(CH_2)_7-Si(OMe)_2$
98	0			—	—		$-(CH_2)_7-Si(OMe)_2$































[0069]

[Table 11]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
99	0			—	—		$-\text{CH}=\text{CH}-\text{Si}(\text{OEt})_3$
100	0			—	—		$-\text{CH}=\text{CH}-\text{CH}_2-$ $-\text{Si}(\text{OMe})_2\text{Me}$
101	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-$ $-\text{Si}(\text{OMe})_3$
102	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_3-$ $-\text{Si}(\text{OMe})_2\text{Me}$
103	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-$ $-\text{SiMe}_2(\text{OMe})$
104	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-$ $-\text{Si}(\text{OEt})_3$
105	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_{10}-$ $-\text{Si}(\text{OMe})_3$
106	0			—	—		$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-$ $-\text{Si}(\text{OMe})_3$
107	0			—	—		$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-$ $(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
108	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-$ $-\text{Si}(\text{OMe})_3$








































[0070]

[Table 12]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
109	0			—	—		-CH=N(CH ₂) ₃ -Si(OMe) ₃
110	0			—	—		-CH=N(CH ₂) ₃ -Si(OEt) ₃
111	0			—	—		-CH=N-CH ₂ -Si(OMe) ₂ Me
112	0			—	—		-CH=N-C ₆ H ₄ - (CH ₂) ₃ -Si(OMe) ₃
113	0			—	—		-CH=N(CH ₂) ₃ -Si(OMe) ₃
114	0			—	—		-O-(CH ₂) ₃ -Si(OMe) ₃
115	0			—	—		-O-(CH ₂) ₃ -Si(OEt) ₃
116	0			—	—		-CH ₂ -O-(CH ₂) ₃ -Si(OMe) ₃
117	0			—	—		-(CH ₂) ₃ -O-(CH ₂) ₃ -Si(OMe) ₃
118	0			—	—		-CH ₂ -O-(CH ₂) ₃ -Si(OMe) ₃


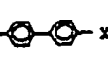
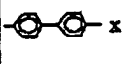

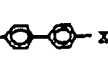
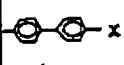


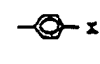





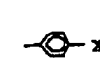


















[0071]

[Table 13]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
119	0			—	—		$-\text{CH}_2\text{COO}-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
120	0			—	—		$-(\text{CH}_2)_7\text{COO}-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
121	0			—	—		$-(\text{CH}_2)_7\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
122	0			—	—		$-\text{CH}_2\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
123	0			—	—		$-(\text{CH}_2)_7\text{COO}-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
124	0			—	—		$-(\text{CH}_2)_7\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
125	0			—	—		$-\text{CH}_2\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
126	0			—	—		$-(\text{CH}_2)_7\text{COO}-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
127	0			—	—		$-(\text{CH}_2)_7\text{COO}-\text{CH}_2\text{C}_6\text{H}_4\text{Si}(\text{OMe})_3$
128	0			—	—		$-(\text{CH}_2)_7\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
129	0			—	—		$-\text{CH}_2\text{COO}-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
130	0			—	—		$-(\text{CH}_2)_7\text{COO}-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$
131	0			—	—		$-(\text{CH}_2)_7\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7\text{Si}(\text{OMe})_3$





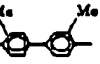




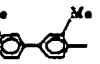




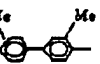




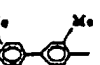




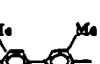




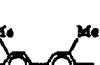









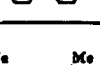




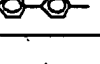




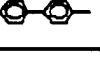
[0072]

[Table 14]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
132	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
133	0			—	—		$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
134	0			—	—		$-\text{CH}_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
135	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
136	0			—	—		$-(\text{CH}_2)_7-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
137	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
138	0			—	—		$-(\text{CH}_2)_7-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
139	0			—	—		$-(\text{CH}_2)_7-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
140	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
141	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
142	0			—	—		$-(\text{CH}_2)_7-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$



















































[0073]

[Table 15]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
143	1						$-(CH_2)_7-Si(OEt)_3$
144	1						$-(CH_2)_7-Si(OEt)_3$
145	1						$-(CH_2)_6-Si(OMe)_3$
146	1						$-(CH_2)_6-SiMe(OMe)_2$
147	1						$-(CH_2)_6-SiMe_2(OMe)$
148	1						$-(CH_2)_6-Si(OEt)_2$
149	1						$-(CH_2)_7-C_6H_4-Si(OMe)_3$
150	1						$-(CH_2)_7-C_6H_4-Si(OMe)_3$ $(CH_2)_7-Si(OMe)_3$
151	1						$-(CH_2)_7-Si(OMe)_2Me$
152	1						$-(CH_2)_6-Si(OMe)_3$





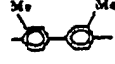




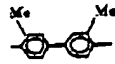




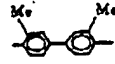










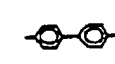














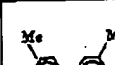










[0074]

[Table 16]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
153	1						$-\text{CH}=\text{CH}-\text{Si}(\text{OEt})_3$
154	1						$-\text{CH}=\text{CH}-\text{CH}_2$ $-\text{Si}(\text{OMe})_2\text{Me}$
155	1						$-\text{CH}=\text{CH}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
156	1						$-\text{CH}=\text{CH}-(\text{CH}_2)_2$ $-\text{SiMe}_2(\text{OMe})_2$
157	1						$-\text{CH}=\text{CH}-(\text{CH}_2)_2$ $-\text{SiMe}_2(\text{OMe})$
158	1						$-\text{CH}=\text{CH}-(\text{CH}_2)_2$ $-\text{Si}(\text{OEt})_3$
159	1						$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-$ $-\text{Si}(\text{OMe})_3$
160	0						$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-$ $-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
161	1						$-\text{CH}=\text{CH}-\text{CH}_2$ $-\text{Si}(\text{OMe})_2\text{Me}$
162	1						$-\text{CH}=\text{CH}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$





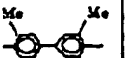




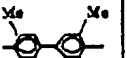




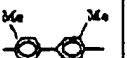




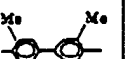




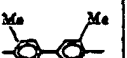









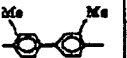














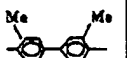




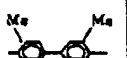




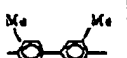
[0075]

[Table 17]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
163	1						-CH=N-CH_3 $\text{-Si(OMe)}_2\text{Me}$
164	1						$\text{-CH=N-(CH}_2)_2$ -Si(OEt)_2
165	1						$\text{-CH=N-(CH}_2)_2$ -Si(OMe)_2
166	1						-CH=N-  $\text{(CH}_2)_7\text{-Si(OMe)}_2$
167	1						-CH=N-CH_3 $\text{-Si(OMe)}_2\text{Me}$
168	1						$\text{-O-(CH}_2)_2\text{-Si(OMe)}_2$
169	1						$\text{-O-(CH}_2)_7$ $\text{SiMe}_2\text{(OMe)}_2$
170	1						$\text{-O-(CH}_2)_7\text{-Si(OEt)}_2$
171	1						$\text{-CH}_2\text{-O-(CH}_2)_2$ -Si(OMe)_2
172	1						$\text{(CH}_2)_7\text{-O-(CH}_2)_2$ -Si(OMe)_2


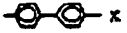









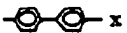


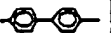
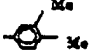



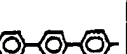
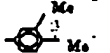




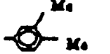



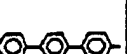





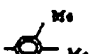




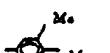




[0076]

[Table 18]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
173	1						$-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
174	1						$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
175	1						$-\text{CH}_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
176	1						$-\text{CH}_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
177	1						$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
178	1						$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
179	1						$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
180	1						$-\text{CH}_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
181	1						$-\text{CH}_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
182	1						$-\text{CH}_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
183	1						$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
184	1						$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$































[0077]

[Table 19]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
185	1						-COO-(CH ₂) ₂ - Si(OMe) ₃
186	1						-COO-CH ₂ -C ₆ H ₄ - Si(OMe) ₃
187	1						-COO-CH ₂ -C ₆ H ₄ - (CH ₂) ₂ -Si(OMe) ₃
188	1						-COO-(CH ₂) ₂ - Si(OMe) ₃
189	1						-COO-CH ₂ -C ₆ H ₄ - Si(OMe) ₃
190	1						-COO-CH ₂ -C ₆ H ₄ - (CH ₂) ₂ -Si(OMe) ₃
191	1						-CH ₂ -COO-(CH ₂) ₂ - Si(OMe) ₃
192	1						-(CH ₂) ₂ -COO- (CH ₂) ₂ -Si(OMe) ₃
193	1						-(CH ₂) ₂ -COO- CH ₂ -C ₆ H ₄ -(CH ₂) ₂ - Si(OMe) ₃

[0078]

[Table 20]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
194	0			—	—		$-(CH_2)_7-Si(OMe)_2Me$
195	0			—	—		$-(CH_2)_7-Si(OEt)_3$
196	0			—	—		$-(CH_2)_6-Si(OMe)_3$
197	0			—	—		$-(CH_2)_6-SiMe(OMe)_2$
198	0			—	—		$-(CH_2)_6-SiMe_2(OMe)$
199	0			—	—		$-(CH_2)_6-Si(OEt)_3$
200	0			—	—		$-(CH_2)_5-Si(OMe)_3$
201	0			—	—		$-(CH_2)_7-C_6H_4-Si(OMe)_3$
202	0			—	—		$-(CH_2)_7-C_6H_4-(CH_2)_7-Si(OMe)_3$
203	0			—	—		$-(CH_2)_6-Si(OMe)_3$































[0079]

[Table 21]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
204	0			—	—		$-\text{CH}=\text{CH}-\text{Si}(\text{OMe})_3$
205	0			—	—		$-\text{CH}=\text{CH}-\text{CH}_2-\text{Si}(\text{OMe})_2\text{Me}$
206	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
207	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_3-\text{SiMe}_2(\text{OMe})_2$
208	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{SiMe}_2(\text{OMe})$
209	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
210	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_{10}-\text{Si}(\text{OMe})_3$
211	0			—	—		$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
212	0			—	—		$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
213	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$

[0080]

[Table 22]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
214	0			—	—		$-\text{CH}=\text{N}(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
215	0			—	—		$-\text{CH}=\text{N}(\text{CH}_2)_3$ $-\text{Si}(\text{OEt})_3$
216	0			—	—		$-\text{CH}=\text{N}-\text{CH}_2$ $-\text{Si}(\text{OMe})_2\text{Me}$
217	0			—	—		$-\text{CH}=\text{N}-\text{C}_6\text{H}_4-$ $(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$
218	0			—	—		$-\text{CH}=\text{N}(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
219	0			—	—		$-\text{O}(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
220	0			—	—		$-\text{O}(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_2\text{Me}$
221	0			—	—		$-\text{O}(\text{CH}_2)_3$ $-\text{Si}(\text{OEt})_3$
222	0			—	—		$-\text{CH}_2\text{O}(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
223	0			—	—		$-(\text{CH}_2)_3\text{O}(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_2\text{Me}$

[0081]

[Table 23]

















































化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
224	1						$-(CH_2)_4-Si(OMe)_3$
225	1						$-(CH_2)_4-Si(OEt)_3$
228	1						$-CH_2CH_2-(CH_2)_2-Si(OMe)_3$
227	1						$-CH_2CH_2-(CH_2)_2-Si(OMe)_3$
228	1						$-CH_2CH_2-CH_2-Si(OMe)_2Me$
229	1						$-CH_2CH_2-C_6H_4-Si(OMe)_3$
230	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
231	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
232	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
233	1						$-CH=CH-CH_2-Si(OMe)_2Me$
234	1						$-CH=CH-C_6H_4-Si(OMe)_3$

[0082]
[Table 24]

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
235	1						$-\text{CH}=\text{N}-(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$
236	1						$-\text{CH}=\text{N}-(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$
237	1						$-\text{CH}=\text{N}-(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$
238	1						$-\text{CH}=\text{N}-\text{CH}_2-\text{Si}(\text{OMe})_2\text{Me}$
239	1						$-\text{CH}=\text{N}-\text{C}_6\text{H}_4-(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$
240	1						$-\text{O}-(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$
241	1						$-\text{O}-(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$
242	1						$-\text{CH}_2-\text{O}-(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$
243	1						$-\text{CH}_2-\text{O}-(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$
244	1						$-(\text{CH}_2)_3-\text{O}-(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$

[0083]

[Table 25]

化合物	k	Ar ₁	Ar ₂	Ar ₃	Ar ₄	Ar ₅	X
245	0			—	—		$-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
246	0			—	—		$-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
247	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
248	0			—	—		$-\text{CH}_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{O}i\text{Pr})_3$
249	0			—	—		$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
250	0			—	—		$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{O}i\text{Pr})_3$
251	1						$-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
252	1						$-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
253	1						$-\text{CH}_2-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
254	1						$-\text{CH}_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{O}i\text{Pr})_3$
255	1						$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
256	1						$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{O}i\text{Pr})_3$

[0084] Although the content of a compound general formula [which is used for the photosensitive layer of this invention] (I) Expressed can be used in 1 - 100% of the weight of the range, it is preferably desirable to consider as 40 - 60 % of the weight still more preferably ten to 90% of the weight.

[0085] In this invention, the fluorine content compound used for a photosensitive layer has the effect of preventing the adhesion of a toner, paper powder, etc. to a photo conductor front face, and fluorine content resins, such as truffle RUORO ethylene, a tetrafluoroethylene, a fluoride vinyl, and fluoride BUNIRIDEN, or the particle of those can be used for it.

[0086] Especially a suitable thing also in the fluorine content compound used for the photosensitive layer of this invention By using ** which is the compound in which crosslinking reaction is possible, and these through the inorganic glassy network subgroup expressed with G in the compound expressed with a general formula (I) which has an alkoxysilane machine, a silanol group, etc. Since the fall of the mechanical strength by a fluorine content compound and the compound expressed with a general formula (I) forming a part of structure of cross linkage [at least] in a photosensitive layer, and making a fluorine content compound contain decreases, it is suitable. As a fluorine content compound which has an alkoxysilane machine, a silanol group, etc. Triethoxysilane, (Trideca fluoro -1, 1 and 2, 2-tetrahydro octyl) Trimethoxysilane, 3-(heptafluoro isopropoxy) propyl triethoxysilane, (3, 3, and 3-truffle RUORO propyl) A 1H, 1H, 2H, 2H-perfluoroalkyl triethoxysilane, 1H, 1H and 2H, 2H-perfluoro decyltriethoxysilane, 1H, 1H and 2H, and 2H-perfluoro octyl TORIETOSHI xylan etc. is mentioned.

[0087] Although it is desirable to consider as 15 or less % of the weight in the layer to add as for the addition of the fluorine content compound used for the photosensitive layer of this invention, when the compound and bridge formation which are expressed with a general formula (I) are possible, it is also possible to add about 40% of the

weight.

[0088] In this invention, the antioxidant used for a photosensitive layer is added in order to prevent degradation by oxidizing gases, such as ozone generated with an electrification vessel. Since the photo conductor will have contacted by the oxidizing gas for a long time when the mechanical strength on the front face of a photo conductor is raised, resistance stronger than before is required. Then, in addition to using what has oxidation resistance as structure of a photoelectrical property subunit expressed with F in the compound expressed with a general formula (I), in the electrophotography photo conductor of this invention, it has high oxidation resistance by adding an antioxidant. As an antioxidant, although a hindered phenol system or a hindered amine system is desirable, you may use an antioxidant with well-known organic sulfur system antioxidant, force fight system antioxidant, dithiocarbamic-acid salt system antioxidant, thiourea system antioxidant, bends imidazole system antioxidant, etc. As a hindered phenol system antioxidant 2, 6-G t-butyl-4-methyl phenol, 2, a 5-G t-butyl hydroquinone, an N and N'-hexamethylene screw (5-G t-butyl-4-hydroxy hydronalium thinner MAIDO 3 --) 3 5-G t-butyl-4-hydroxy-benzyl force FONETO-diethyl ester, 2, 4-screw [(octyl thio)methyl]-o-cresol, 2, 6-G t-butyl-4-ethylphenol, A 2 and 2'-methylene screw (4-methyl-6-t-butylphenol), A 2 and 2'-methylene screw (4-ethyl-6-t-butylphenol), 4 and 4'-butylidenebis (3-methyl-6-t-butylphenol), 2, 5-G t-amyl hydroquinone, 2-t-butyl-6-(3-butyl-2-hydroxy-5-methyl benzyl)-4-methylphenyl acrylate, 4, and 4'-butylidenebis (3-methyl-6-t-butylphenol) etc. is mentioned.

[0089] The most desirable gestalt contains simultaneously the antioxidant used for this invention at a photosensitive layer in the surface-protection layer containing the compound and fluorine content compound which are expressed with a general formula (I). However, ozone and NO_x which are generated in live-part material Although there are not only the surface chisel of a photo conductor but few amounts, gas permeates to a photosensitive layer called lower layer charge generating layer and charge transporting bed, and causes oxidization degradation. Therefore, in order to raise the oxidation resistance of the whole photo conductor, it is desirable to add an antioxidant also in the layer which does not contain the compound expressed with a general formula (I).

[0090] As an addition of the antioxidant used for the photosensitive layer of this invention, even when adding in which layer, 15 or less % of the weight of each class is desirable, and 10 or less % of the weight is still more desirable. If it exceeds 15 % of the weight, evils, such as a fall of a mechanical strength and a fall of a photoelectrical property, will arise.

[0091] General formula (I) When forming the bridge formation film containing the compound, fluorine content compound, and antioxidant which are expressed, crosslinking reaction is independently possible for the compound general formula (I) Expressed, and it can form a bridge formation hardening film. However, in order to make good film properties, such as front-face nature and intensity, it is desirable to use simultaneously other hardenability compounds which can be combined through the inorganic glassy network subgroup expressed with G in the compound general formula (I) Expressed.

[0092] When the compound expressed with a general formula (II) is chosen as an example of a compound expressed with a general formula (I), as a hardenability compound used together for film formation, a hardenability siloxane resin well-known as silicon hard-coat etc. can be used. Specifically, the organic system siloxane resin and alkoxysilane which have two or more silanol groups, silane coupling agents, those mixture, etc. can be used.

[0093] In order to acquire a desired property in this photosensitive layer if needed, you may make a photosensitive layer contain leveling agents, such as a well-known additive, for example, a silicone oil etc., besides the aforementioned indispensable component, etc. in this invention.

[0094] As for the compound, fluorine content compound, and antioxidant which are general formula [which is used for a photosensitive layer] (I) Expressed, in this invention, it is desirable to contain the blemish on the front face of a photo conductor, prevention of degradation by wear, and the adhesion of a toner and paper powder to a photo conductor front face in the layer in the maximum front face of a photosensitive layer from a viewpoint which degradation by oxidizing gases, such as ozone generated in prevention and the electrification process on the front face of a photo conductor, prevents. For example, in the case of the structure of having a surface-protection layer on the maximum front face of a photosensitive layer, it is desirable to make the surface-protection layer contain these compounds, and it can use a well-known thing from the former as a photosensitive layer used as the ground. The layer structure of a photo conductor which has this photosensitive layer may be arbitrary, the laminating type which carried out the laminating of a charge generating layer and the charge transporting bed is sufficient as it, and the monolayer type containing charge generating material is sufficient as it. Moreover, it is desirable to make the compound, fluorine content compound, and antioxidant which are expressed with a charge generating layer to a charge transporting bed by the general formula (I) when a charge generating layer is the maximum surface layer when a charge transporting bed is the maximum surface layer contain by the case where a photosensitive layer is a laminating type. When a photosensitive layer is a monolayer type, into it, with charge generating material etc., the compound, fluorine content

compound, and antioxidant which are expressed with a general formula (I) are made to contain, and it can use further again.

[0095] Although it is desirable in this invention to contain the compound, fluorine content compound, and antioxidant which are expressed with a general formula (I) in a surface-protection layer as above-mentioned when preparing a surface-protection layer in a photosensitive layer In order to form a surface-protection layer, with the compound, fluorine content compound, and antioxidant which are expressed with a general formula (I) After responding to **, preparing the coating liquid which mixed the solvent etc. to the hardenability siloxane resin which is the hardenability compound of the aforementioned publication if needed and applying on a photosensitive layer, it is desirable by heating to carry out bridge formation hardening from a viewpoint of surface intensity.

[0096] it is added for liquid viscosity control etc., the usual organic solvents, such as a methanol, ethanol, n-propanol, n-butanol, benzyl alcohol, a methyl cellosolve, ethylcellosolve, an acetone, a methyl ethyl ketone, a cyclohexanone, methyl acetate, acetic-acid n-butyl, a dioxane, a tetrahydrofuran, methylene chloride, and chloroform, are mentioned as a solvent which can be used, and the solvent used for formation of a surface-protection layer in this invention is independent in these -- or two or more sorts can be mixed and it can use

[0097] In formation of the surface-protection layer of this invention, although you may carry out with a non-catalyst in case a bridge formation hardening reaction is performed, you may use a suitable catalyst. As a catalyst, the iron salt of organic titanium compounds, such as organic tin compounds, such as tin, a tetrapod-n-butyl titanate, and tetrapod isopropyl titanate, and an organic carboxylic acid, manganese salt, cobalt salt, zinc salt, a zirconium salt, etc. are mentioned bases, such as acid catalysts, such as a hydrochloric acid, a sulfuric acid, formic acid, an acetic acid, and a trifluoroacetic acid, ammonia, and a triethylamine, a dibutyl tin diacetate, dibutyltin dioctoate, and for a start [OKUE acid]. Moreover, the temperature in the case of a hardening reaction is preferably set as room temperature -150 degree, although there is especially no limit.

[0098] In this invention, the usual methods, such as the blade coating method, the MAIYA bar coating method, the spray coating method, a dip coating method, the bead coating method, the air-knife-coating method, and the curtain coating method, can be used as the method of application of the surface-protection layer containing the compound, fluorine content compound, and antioxidant which are expressed with a general formula (I). As for the thickness of a surface-protection layer, it is desirable to be referred to as about 1-10 micrometers.

[0099] In this invention, when adopting a laminating type photosensitive layer, the charge generating layer which constitutes it contains charge generating material and a binding resin, in a charge generating layer, may respond to ** and may add well-known additives, such as a leveling agent (surface smoothing) and a coupling agent (improvement in adhesion).

[0100] As a charge generating material used for the charge generating layer of this invention, an organic pigment and colors, such as inorganic system photoconductivity material, such as an amorphous selenium and crystallinity selenium-tellurium alloy, a selenium-arsenic alloy, other selenium compounds and a selenium alloy, a zinc oxide, and titanium oxide, a phthalocyanine system, a squarylium system, an anthanthrone system, a perylene system, an azo system, an anthraquinone system, a pyrene system, pyrylium salt, and thia pyrylium salt, are used. Also in it, especially since photosensitivity is high, it is suitable, and a phthalocyanine system compound has a non-metal phthalocyanine, an oxy-titanium phthalocyanine, a gallium-halide phthalocyanine, a hydroxy gallium phthalocyanine, and a desirable halogenation tin phthalocyanine. the Bragg angle especially in an X diffraction spectrum ($2\theta \approx 0.2$ degree) 7.4 degrees, 16.6 degrees, 25.5 degrees, the chloro gallium phthalocyanine that has specific crystal form with a diffraction peak strong against 28.3 degrees, or the Bragg angle in an X diffraction spectrum ($2\theta \approx 0.2$ degree) The hydroxy gallium phthalocyanine which has specific crystal form with 7.5 degrees, 9.9 degrees, 12.5 degrees, 16.3 degrees, 18.6 degrees, 25.1 degrees, and a diffraction peak strong against 28.3 degrees It has high charge generating efficiency from the light to the light of the large field of near-infrared light, and is especially desirable.

[0101] As a binding resin used for the charge generating layer of this invention, although it is polyvinyl butyral resin, a polyvinyl-formal resin, a partial denaturation polyvinyl-acetal resin, polycarbonate resin, polyester resin, acrylic resin, a polyvinyl chloride resin, polystyrene resin, a polyvinyl-acetate resin, a vinyl chloride vinyl acetate copolymer, silicon resin, phenol resin, a Polly N-vinylcarbazole resin, etc., it is not limited to Kora soil. these binding resins are independent -- or two or more sorts can be mixed and it can use The compounding ratio (weight ratio) of the charge generating material and the binding resin which are used for the charge generating layer of this invention has the desirable range of 10:1-1:10.

[0102] as a solvent used for applying the charge generating layer of this invention, the usual organic solvents, such as a methanol, ethanol, n-propanol, n-butanol, benzyl alcohol, a methyl cellosolve, ethylcellosolve, an acetone, a methyl ethyl ketone, a cyclohexanone, methyl acetate, acetic-acid n-butyl, a dioxane, a tetrahydrofuran, methylene chloride, and chloroform, are mentioned, and independent in these -- or two or more sorts can be mixed and it can use Generally

in this invention, 0.1-5-micrometer 0.2-2.0 micrometers are preferably suitable for the thickness of a charge generating layer.

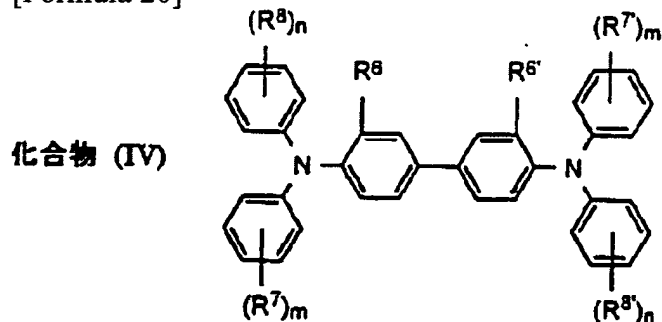
[0103] It can set to this invention and the usual methods, such as the blade coating method, the MAIYA bar coating method, the spray coating method, a dip coating method, the bead coating method, the air-knife-coating method, and the curtain coating method, can be used as the method of application of a charge generating layer.

[0104] In this invention, the charge transporting bed in a laminating type photosensitive layer contains charge transportation material and a binding resin, or contains macromolecule charge transportation material.

[0105] As a charge transportation material used for the charge transporting bed of this invention Quinone system compounds, such as para benzoquinone, a chloranil, BUROMANIRU, and anthraquinone, a tetracyano quinodimethan system compound, 2 and 4, and 7-trinitro full -- me -- full, such as non, -- me -- non -- a compound -- A xanthone system compound, a benzophenone system compound, a cyano vinyl system compound, Electronic suction nature matter, such as an ethylene system compound, a triaryl amine system compound, a benzidine system compound, an aryl alkane system compound, an aryl substitution ethylene system compound, a stilbene system compound, an anthracene system compound, a hydrazone system compound, etc. are raised. such charge transportation material is independent -- or two or more sorts can be mixed and it can use Since it has high charge (hole) transportation ability and the outstanding stability, especially the benzidine system compound expressed with the following general formula (IV) and the triaryl amine system compound expressed with the following general formula (V) can be used especially preferably. Each example of a compound is shown in a table. these are independent -- or two or more sorts can be mixed and it can use

[0106]

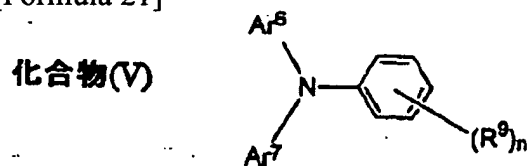
[Formula 20]



[0107] The inside of a general formula (IV), and R6 And a hydrogen atom, a halogen atom, the alkyl group of carbon numbers 1-5, or a carbon number expresses the alkoxy group of 1-5, and R6' may be the same and may differ. A hydrogen atom, a halogen atom, the alkyl group of carbon numbers 1-5, and a carbon number may express R7, R7', and the substitution amino group by which it was replaced by the alkoxy group of 1-5, or the alkyl group of carbon numbers 1-2, and R8 and R8' may have them, and may differ from each other. [same] m and n express the integer of 0-2.

[0108]

[Formula 21]



[0109] The inside of a general formula (V), and R9 Expressing a hydrogen atom or a methyl group, n expresses 1 or 2. Ar6 And Ar7 The aryl group which is not replaced [substitution or] is expressed and the substitution amino group replaced by the alkyl group of a halogen atom and carbon numbers 1-5, the alkoxy group of carbon numbers 1-5, or the alkyl group of carbon numbers 1-2 is expressed as this substituent.

[0110] Although mentioned by showing a concrete functional group [in / a general formula (IV) / for the instantiation compound "IV-1-IV-54" of the benzidine system compound expressed with a general formula (IV)] in the following table 26, this invention is not restricted to these.

[0111]

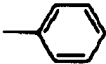
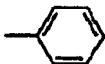
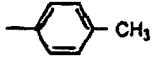
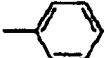
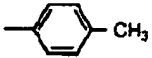
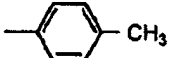
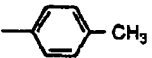
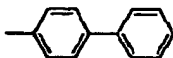
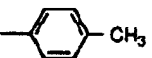
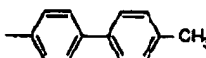
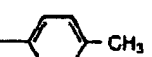

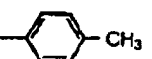
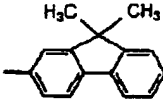
[Table 26]

一般式(IV)の 例示化合物 No.	R ⁶ , R ^{6'}	(R ⁷) _m , (R ^{7'}) _m	(R ⁸) _n , (R ^{8'}) _n	一般式(IV)の 例示化合物 No.	R ⁶ , R ^{6'}	(R ⁷) _m , (R ^{7'}) _m	(R ⁸) _n , (R ^{8'}) _n
IV-1	CH ₃	H	H	IV-28	Cl	H	H
IV-2	CH ₃	2-CH ₃	H	IV-29	Cl	2-CH ₃	H
IV-3	CH ₃	3-CH ₃	H	IV-30	Cl	3-CH ₃	H
IV-4	CH ₃	4-CH ₃	H	IV-31	Cl	4-CH ₃	H
IV-5	CH ₃	4-CH ₃	2-CH ₃	IV-32	Cl	4-CH ₃	2-CH ₃
IV-6	CH ₃	4-CH ₃	3-CH ₃	IV-33	Cl	4-CH ₃	3-CH ₃
IV-7	CH ₃	4-CH ₃	4-CH ₃	IV-34	Cl	4-CH ₃	4-CH ₃
IV-8	CH ₃	3,4-CH ₃	H	IV-35	C ₂ H ₅	H	H
IV-9	CH ₃	3,4-CH ₃	3,4-CH ₃	IV-36	C ₂ H ₅	2-CH ₃	H
IV-10	CH ₃	4-C ₂ H ₅	H	IV-37	C ₂ H ₅	3-CH ₃	H
IV-11	CH ₃	4-C ₃ H ₇	H	IV-38	C ₂ H ₅	4-CH ₃	H
IV-12	CH ₃	4-C ₄ H ₉	H	IV-39	C ₂ H ₅	4-CH ₃	4-CH ₃
IV-13	CH ₃	4-C ₂ H ₅	2-CH ₃	IV-40	C ₂ H ₅	4-C ₂ H ₅	4-CH ₃
IV-14	CH ₃	4-C ₂ H ₅	3-CH ₃	IV-41	C ₂ H ₅	4-C ₃ H ₇	4-CH ₃
IV-15	CH ₃	4-C ₂ H ₅	4-CH ₃	IV-42	C ₂ H ₅	4-C ₄ H ₉	4-CH ₃
IV-16	CH ₃	4-C ₂ H ₅	3,4-CH ₃	IV-43	OCH ₃	H	H
IV-17	CH ₃	4-C ₃ H ₇	3-CH ₃	IV-44	OCH ₃	2-CH ₃	H
IV-18	CH ₃	4-C ₃ H ₇	4-CH ₃	IV-45	OCH ₃	3-CH ₃	H
IV-19	CH ₃	4-C ₄ H ₉	3-CH ₃	IV-46	OCH ₃	4-CH ₃	H
IV-20	CH ₃	4-C ₄ H ₉	4-CH ₃	IV-47	OCH ₃	4-CH ₃	4-CH ₃
IV-21	CH ₃	4-C ₂ H ₅	4-C ₂ H ₅	IV-48	OCH ₃	4-C ₂ H ₅	4-CH ₃
IV-22	CH ₃	4-C ₂ H ₅	4-OCH ₃	IV-49	OCH ₃	4-C ₃ H ₇	4-CH ₃
IV-23	CH ₃	4-C ₃ H ₇	4-C ₃ H ₇	IV-50	OCH ₃	4-C ₄ H ₉	4-CH ₃
IV-24	CH ₃	4-C ₃ H ₇	4-OCH ₃	IV-51	CH ₃	2-N(CH ₃) ₂	H
IV-25	CH ₃	4-C ₄ H ₉	4-C ₄ H ₉	IV-52	CH ₃	3-N(CH ₃) ₂	H
IV-26	CH ₃	4-C ₄ H ₉	4-OCH ₃	IV-53	CH ₃	4-N(CH ₃) ₂	H
IV-27	H	3-CH ₃	H	IV-54	CH ₃	4-Cl	H

[0112] Although mentioned by showing a concrete functional group [in / a general formula (V) / for the instantiation compound "V-1 to V-62" of the triaryl amine system compound expressed with a general formula (V)] in the following tables 27-31, this invention is not restricted to these.

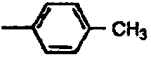
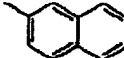
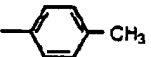
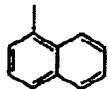
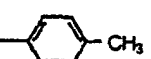
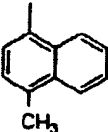
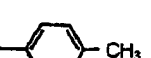
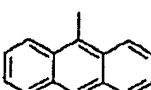
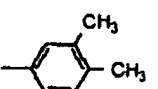
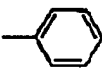
[0113]

[Table 27]

一般式 (V) の例示化合物 No.	R ⁹	Ar ⁶	Ar ⁷
V-1	4-CH ₃		
V-2	3, 4-CH ₃		
V-3	4-CH ₃		
V-4	3, 4-CH ₃		
V-5	4-CH ₃		
V-6	3, 4-CH ₃		
V-7	4-CH ₃		
V-8	3, 4-CH ₃		
V-9	4-CH ₃		
V-10	3, 4-CH ₃		
V-11	4-CH ₃		
V-12	3, 4-CH ₃		
V-13	4-CH ₃		
V-14	3, 4-CH ₃		

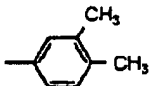
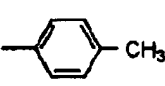
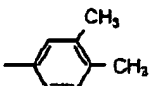
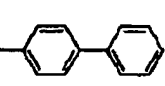
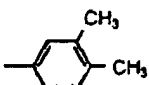
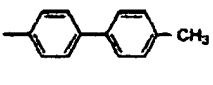
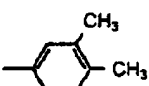
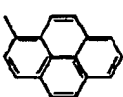
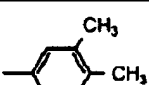
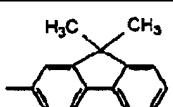
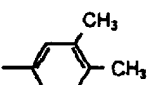
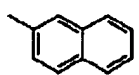
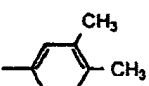
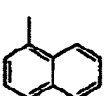
[0114]

[Table 28]

一般式 (V) の例示化合物 No.	R ⁹	Ar ⁶	Ar ⁷
V-15	4-CH ₃		
V-16	3, 4-CH ₃		
V-17	4-CH ₃		
V-18	3, 4-CH ₃		
V-19	4-CH ₃		
V-20	3, 4-CH ₃		
V-21	4-CH ₃		
V-22	3, 4-CH ₃		
V-23	4-CH ₃		
V-24	3, 4-CH ₃		

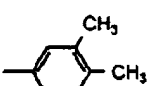
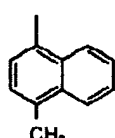
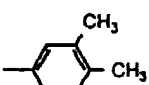
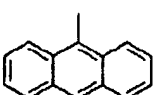
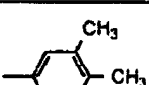
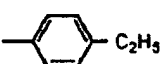
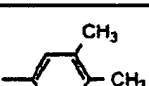
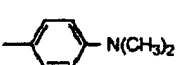
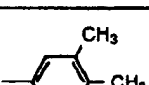
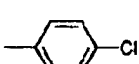
[0115]

[Table 29]

一般式 (V) の例示化合物 No.	R ⁶	Ar ⁶	Ar ⁷
V-25	4-CH ₃		
V-26	3,4-CH ₃		
V-27	4-CH ₃		
V-28	3,4-CH ₃		
V-29	4-CH ₃		
V-30	3,4-CH ₃		
V-31	4-CH ₃		
V-32	3,4-CH ₃		
V-33	4-CH ₃		
V-34	3,4-CH ₃		
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V-38	3,4-CH ₃		

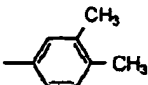
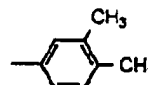
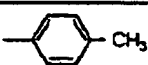

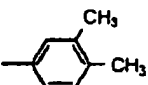



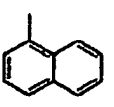
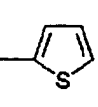
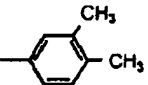
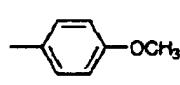
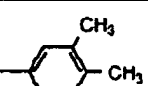
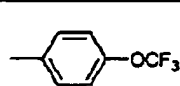
[0116]

[Table 30]

一般式 (V) の例示化合物 No.	R ⁶	Ar ⁶	Ar ⁷
V-39	4-CH ₃		
V-40	3,4-CH ₃		
V-41	4-CH ₃		
V-42	3,4-CH ₃		
V-43	4-CH ₃		
V-44	3,4-CH ₃		
V-45	4-CH ₃		
V-46	3,4-CH ₃		
V-47	4-CH ₃		
V-48	3,4-CH ₃		

[0117]

[Table 31]

一般式 (V) の例示化合物 No.	R ⁶	Ar ^d	Ar ^e
V-49	4-CH ₃		
V-50	3,4-CH ₃		
V-51	4-CH ₃		
V-52	3,4-CH ₃		
V-53	4-CH ₃		
V-54	3,4-CH ₃		
V-55	4-CH ₃		
V-56	3,4-CH ₃		
V-57	4-CH ₃		
V-58	3,4-CH ₃		
V-59	4-CH ₃		
V-60	3,4-CH ₃		
V-61	4-CH ₃		
V-62	3,4-CH ₃		

[0118] As a binding resin used for the charge transporting bed of this invention Polycarbonate resin, polyester resin, methacrylic resin, acrylic resin, A polyvinyl chloride resin, a polyvinylidene chloride resin, polystyrene resin, A polyvinyl-acetate resin, a styrene-butadiene copolymer, a vinylidene-chloride-acrylonitrile copolymer, A vinyl chloride vinyl acetate copolymer, a vinyl chloride-vinyl acetate-maleic-anhydride copolymer, Well-known resins, such as silicon resin, a silicon-alkyd resin, phenol-formaldehyde resin, styrene-acrylic resin, a styrene-alkyd resin, Polly N-vinylcarbazole, and polysilane, can be used.

[0119] As a macromolecule charge transportation material used for the charge transporting bed of this invention, the well-known thing which has charge transportability, such as Polly N-vinylcarbazole and polysilane, can be used. Especially the polyester system macromolecule charge transportation material shown in JP,8-176293,A or JP,8-208820,A has high charge transportability, and is especially desirable.

[0120] as a solvent used for applying the charge transporting bed of this invention, the usual organic solvents, such as ether of the shape of annular [, such as halogenated aliphatic hydrocarbon, such as ketones, such as aromatic hydrocarbons, such as benzene, toluene, a xylene and a chlorobenzene, an acetone, and 2-butanone, a methylene chloride, chloroform, and an ethylene chloride, a tetrahydrofuran, ethyl ether, and a dioxane,] or a straight chain, are mentioned, and independent -- or two or more sorts can be mixed and it can use

[0121] The same well-known method as what was raised with the surface-protection layer or the charge generating layer can be used for the method of application of the charge transporting bed of this invention. The thickness of a charge transporting bed is 5-50 micrometers, and is 10-40 micrometers preferably.

[0122] In this invention, to a charge generating layer and/or a charge transporting bed, you may add an antioxidant in order to prevent degradation by oxidizing gases, such as ozone generated with an electrification vessel. It is for there being ** which a oxidizing gas will penetrate a surface-protection layer even if there is the aforementioned surface-protection layer, and permeates to a charge generating layer and/or a charge transporting bed, and preventing oxidization degradation by this. What was mentioned above, and the same thing can be used as an antioxidant. As an addition of an antioxidant, a charge generating layer and/or 15 or less % of the weight of a charge transporting bed are desirable, and 10 or less % of the weight is still more desirable.

[0123] In this invention, a monolayer type photosensitive layer contains charge generating material and a binding resin, responds to **, also makes charge transportation material contain, and is formed. The thing same as a charge generating material as the charge generating material used for the aforementioned charge generating layer can be used. The thing same as a binding resin as the binding resin used for the aforementioned charge generating layer and a charge transporting bed can be used. Moreover, the thing same as a solvent as the solvent used for a charge generating layer and a charge transporting bed can be used.

[0124] The content of the charge generating material in the monolayer type photosensitive layer of this invention takes preferably for 20 - 50 % of the weight about 10 to 85% of the weight.

[0125] In this invention, you may add charge transportation material to a monolayer type photosensitive layer if needed. It is desirable that **** makes [using the thing same as a charge transportation material as the charge transportation material used for a charge transporting bed] the addition 5 - 50 % of the weight. Furthermore, to a monolayer type photosensitive layer, if needed, since it is the same as that of the case of a charge transporting bed, you may add an antioxidant. as an antioxidant, it is the same as that of what was mentioned above -- although it can use, the addition has 10 or less preferably good % of the weight 15 or less % of the weight

[0126] What the charge generating layer and the charge transporting bed described by the way, and the same thing can be used for the method of application of the monolayer type photosensitive layer of this invention. Thickness is about 5-50 micrometers, and it is still more desirable to be referred to as 10-40 micrometers.

[0127] In this invention, when not preparing a surface-protection layer in a photosensitive layer, as for the compound, fluorine content compound, and antioxidant which are expressed with a general formula (I), it is desirable to make the layer in a described [above] laminating type and the monolayer type maximum front face contain. Specifically, in a laminating type case, if a charge transporting bed is a front face, it is desirable to make the compound, fluorine content compound, and antioxidant which are general formula (I) Expressed with a charge generating layer to a charge transporting bed if a charge generating layer is a front face contain. Moreover, the compound, fluorine content compound, and antioxidant which are expressed with a general formula (I) with charge generating material etc. in it can be made to contain in a monolayer type case. The method of application of each layer which made the compound, fluorine content compound, and antioxidant which are expressed with a general formula (I) contain is the same as that of the method of application of each aforementioned layer. Moreover, in any case, it is desirable to carry out bridge formation hardening, and it can carry out a bridge formation hardening reaction to it. [as well as the case of the aforementioned protective layer]

[0128] (Image formation equipment) In this invention, image formation equipment is characterized by being the electrophotography photo conductor mentioned above and image formation equipment of the electrophotography method which has a cleaning means mechanical in the electrification means row, and an electrification means being a contact electrification method at least. You may have a development means to form an image using exposure meanses, such as a laser beam study system and an LED array, a toner, etc., an imprint means to copy a toner image to media, such as paper, a fixing means to fix a toner image to media, such as paper, an electric discharge means to remove the electrostatic latent image which remains on the photo conductor front face, a mechanical cleaning means, etc., by the well-known method if needed. A mechanical cleaning means can contact a photo conductor front face directly, and can remove the toner and paper powder adhering to the front face, dust, etc., and well-known things, such as a blade, a brush, and a roll, can be used for it.

[0129] Drawing 1 is the outline block diagram showing an example of the image formation equipment of this invention. The image formation equipment of this invention has a photo conductor 10, a contact electrification machine with the electrification roll 12, the laser exposure optical system 14, the development counter 16 using the fine-particles toner, the roll 18 for an imprint, the cleaning blade 20, and the fixing roll 22. Moreover, between the roll 18 for "imprint, and the cleaning blade 20, the light source 19 for electric discharge is arranged.

[0130] In the image formation equipment of this invention, a contact electrification method electrifies a photo conductor front face by impressing voltage to the conductive member contacted on the photo conductor front face. conductivity -- although any, such as the shape of the shape of the shape of a brush and a blade, the shape of a pin electrode, and a roller, are sufficient as the configuration of a member, especially its roller-like member is desirable. Usually, a roller-like member consists of a resistive layer, an elastic layer which supports them, and a core material from an outside. Furthermore, a protective layer can be prepared in the outside of a resistive layer if needed.

[0131] In the conductive member of this invention, as the quality of the material of a core material, it has conductivity and, generally iron, copper, brass, stainless steel, aluminum, nickel, etc. are used. Moreover, the resin mold goods which distributed the conductive particle etc. in addition to this can be used.

[0132] In the conductive member of this invention, as the quality of the material of an elastic layer, it has conductivity or half-conductivity and, generally a conductive particle or a half-conductivity particle is distributed to rubber material. As rubber material, EPDM, a polybutadiene, natural rubber, a polyisobutylene, SBR, CR and NBR, silicone rubber, polyurethane rubber, epichlorohydrin rubber, SBS, thermoplastic elastomer, NORUBONENGOMU, a fluorosilicone rubber, ethylene oxide rubber, etc. are used.

[0133] In the conductive member of this invention as a conductive particle or a half-conductivity particle Carbon black, zinc, aluminum, copper, iron, nickel, chromium, Metals, such as titanium, ZnO-aluminum 2O3, and SnO2-Sb 2O3, In2 O3-SnO2, ZnO-TiO2, and MgO-aluminum 2O3, metallic oxides, such as FeO-TiO2, TiO2, SnO2, Sb 2O3, In

2O₃, ZnO, and MgO, can use, and such material is independent -- or two or more sorts may be mixed and you may use

[0134] what distributed the conductive particle or the half-conductivity particle to the binding resin as the quality of the material of a resistive layer and a protective layer, and controlled the resistance in the conductive member of this invention -- it is -- as resistivity -- 103-1014-ohmcm -- desirable -- 105-1012-ohmcm -- 107-1012-ohmcm is still more preferably good. Moreover, as thickness, 0.01-1000-micrometer 0.1-500-micrometer 0.5-100 micrometers are still more preferably good. As a binding resin, they are polyolefin resin, such as acrylic resin, a cellulosic resin, polyamide resin, methoxymethyl-ized nylon, ethoxy methylation nylon, a polyurethane resin, polycarbonate resin, polyester resin, a polyethylene resin, a polyvinyl resin, a polyarylate resin, the poly thiophene resin, and PFA, FEP, PET, and a styrene butadiene. A resin etc. is used. The carbon black same as a conductive particle or a half-conductivity particle as an elastic layer, a metal, and a metallic oxide are used. Moreover, bulking agents, such as antioxidants, such as a hindered phenol and hindered amine, clay, and a kaolin, and lubricant, such as a silicone oil, can be added if needed.

[0135] In the conductive member of this invention, the blade coating method, the MAIYA bar coating method, the spray coating method, a dip coating method, the bead coating method, the air-knife-coating method, the curtain coating method, etc. can be used as a means to form these layers.

[0136] As a method of electrifying a photo conductor using these conductive members, although voltage is impressed to a conductive member, as for applied voltage, what superimposed alternating voltage on direct current voltage or direct current voltage is desirable. As a range of voltage, as for direct current voltage, according to the photo conductor electrification potential demanded, positive or negative 50-2000V are desirable, and especially 100-1500V are desirable. When it superimposes alternating voltage, 1200-1600V have the preferably [it is desirable and] desirable voltage between peaks to 800-1600V, and a pan 400-1800v. the frequency of alternating voltage -- 50-20,000Hz -- desirable -- It is 100-5,000Hz.

[0137]

[Example] Although the example of this invention is shown below, this invention is not limited to these examples at all. In addition, the "section" in the following examples and examples of comparison means the weight section.

[0138] (Example 1)

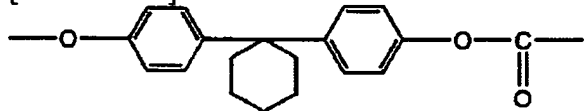
- On the aluminum pipe (outer diameter of 30mm) base which performed formation-honing processing of an undercoating layer, the solution which consists of the zirconium compound (tradename : "ORGANO Chicks ZC540" Matsumoto Pharmaceuticals company make) 10 section and the silane compound (tradename: "A1110", Nippon Unicar make) 1 section, the isopropanol 40 section, and the butanol 20 section was applied by the dip coating method, stoving was carried out for 10 minutes in 150 degrees C, and the undercoating layer of 0.1 micrometers of thickness

[0139] - Bragg Angle (2Theta**0.2 Degree) in Formation-X Diffraction Spectrum of Charge Generating Layer the one section of a chloro gallium phthalocyanine with 7.4 degrees, 16.6 degrees, 25.5 degrees, and a diffraction peak strong against 28.3 degrees -- a polyvinyl butyral (tradename: "id REKKU BM-S" --) After it mixes with the 1 by Sekisui Chemical Co., Ltd. section, and the acetic-acid n-butyl 100 section, and it processes for 1 hour and a paint shaker distributes with a glass bead, The DIP coat of the obtained application liquid was carried out on the aforementioned under-coating layer, it carried out stoving for 10 minutes at 100 degrees C, and the charge generating layer of about 0.15 micrometers of thickness was formed.

[0140] - The application liquid made to dissolve the benzidine compound 2 section of the formation-instantiation compound (IV-27) of a charge transporting bed and the high-molecular-compound (viscosity-average-molecular-weight 39,000) 3 section shown by the following base unit (VI) in the chlorobenzene 20 section was applied by the dip coating method on the aforementioned charge generating layer, 110 degrees C and heating for 40 minutes were performed, and the charge transporting bed of 20 micrometers of thickness was formed.

[0141]

[Formula 22]



基本単位(VI)

[0142] - Formation-Instantiation Compound (Compound 145) 10 Section of Surface-Protection Layer, and Hardenability Siloxane Resin (Shin-etsu Silicon --) the X-40-2239 20 section, the phenyl triethoxysilane 3 section, and

a fluorine content silane coupling agent (tradename: "KBM-7803" --) the 2 by the Shin-etsu silicon company section, and a hindered phenol system antioxidant (tradename: "MDP-S" --) The spray application of the application liquid which mixed the 1 made from SUMIRAIZA section and the acetic-acid 1 section, and was obtained was carried out on the aforementioned charge transporting bed, 120 degrees C and heat-treatment for 60 minutes were performed after the set to touch for 30 minutes, and the surface-protection layer of 5 micrometers of thickness was formed. The electrophotography photo conductor of an example 1 was produced as mentioned above.

[0143] (Examples 2-7) In the surface-protection layer of an example 1, instead of the instantiation compound (compound 145), (a compound 3), (a compound 13), the (compound 31), the (compound 155), the (compound 178), and the (compound 255) were used, and also the electrophotography photo conductor was produced completely like the example 1, respectively, and it considered as examples 2, 3, 4, 5, 6, and 7, respectively.

[0144] (Example 8)

- It is an aluminum pipe like the formation-example 1 of an undercoating layer. (30mm) The undercoating layer was formed upwards.

[0145] - The Bragg angle [in / an X diffraction spectrum / instead of the chloro gallium phthalocyanine in the formation-example 1 of a charge generating layer] ($2\theta \approx 0.2$ degree) The charge generating layer was similarly formed except having used the hydroxy gallium phthalocyanine which has specific crystal form with 7.5 degrees, 9.9 degrees, 12.5 degrees, 16.3 degrees, 18.6 degrees, 25.1 degrees, and a diffraction peak strong against 28.3 degrees.

[0146] - The application liquid made to dissolve the formation-instantiation compound (IV-27) 2 section of a charge transporting bed, the instantiation compound (V-28) 1 section, and the high-molecular-compound (viscosity average molecular weight 39,000) 3 section shown by the aforementioned base unit (VI) in the chlorobenzene 24 section was applied by the dip coating method on the aforementioned charge generating layer, 110 degrees C and heating for 40 minutes were performed, and the charge transporting bed of 20 micrometers of thickness was formed.

[0147] - The surface-protection layer was formed like the formation-example 1 of a surface-protection layer. The electrophotography photo conductor of an example 8 was produced as mentioned above.

[0148] (Examples 9-12) It is [0149] which produced the electrophotography photo conductor like the example 8, and was made into examples 9-12, respectively except having used (the compound 9), the (compound 10), the (compound 149), and the (compound 150) instead of the instantiation compound (compound 145) in the surface-protection layer of an example 8. (Example 13)

- The undercoating layer was formed on the aluminum pipe (30mm) like the formation-example 1 of an undercoating layer.

- The Bragg angle [in / an X diffraction spectrum / instead of the chloro gallium phthalocyanine in the formation-example 1 of a charge generating layer] ($2\theta \approx 0.2$ degree) The charge generating layer was similarly formed except having used the hydroxy gallium phthalocyanine which has specific crystal form with 7.5 degrees, 9.9 degrees, 12.5 degrees, 16.3 degrees, 18.6 degrees, 25.1 degrees, and a diffraction peak strong against 28.3 degrees.

[0150] - Formation-Bottle DADO Phenol System Antioxidant (Tradename: "MDP-S" --) of Charge Transporting Bed The 0.3 made from SUMIRAIZA section, the instantiation compound (IV-27) 2 section, the instantiation compound (V-28) 1 section, The application liquid made to dissolve the high-molecular-compound (viscosity average molecular weight 39,000) 3 section shown by the aforementioned base unit (VI) in the chlorobenzene 24 section was applied by the dip coating method on the aforementioned charge generating layer, 110 degrees C and heating for 40 minutes were performed, and the charge transporting bed of 20 micrometers of thickness was formed.

[0151] - The surface-protection layer was formed like the formation-example 1 of a surface-protection layer. The electrophotography photo conductor of an example 13 was produced as mentioned above.

[0152] (Example 14) In the surface-protection layer of an example 13, the electrophotography photo conductor was produced like the example 13 instead of the instantiation compound (compound 145) except having used (the compound 225).

[0153] (Example 1 of comparison) In formation of the surface-protection layer of the electrophotography photo conductor of an example 1, the electrophotography photo conductor was similarly produced except not adding an antioxidant.

[0154] (Example 2 of comparison) In formation of the surface-protection layer of the electrophotography photo conductor of an example 1, the electrophotography photo conductor was similarly produced except not adding a fluorine content silane coupling agent.

[0155] (Example 3 of comparison) Like the example 1, the undercoating layer, the charge generating layer, and the charge transporting bed were formed one by one on the aluminum pipe, and the surface-protection layer produced the electrophotography photo conductor, without forming.

[0156] In this way, the "reconstruction machine of LaserPress 4160" by Fuji Xerox was equipped with the

electrophotography photo conductor of the acquired examples 1-14 and the examples 1-3 of comparison, and the print durability test was performed. This "LaserPress 4160 reconstruction machine" has the electrification roll for contact electrification, laser exposure optical system, the toner development counter, the transfer roller, the cleaning blade, and the fixing roll.

[0157] Evaluation of print durability evaluated the quality-of-image evaluation before and behind printing of 50,000 sheets, and the thickness decrement of the photo conductor by wear. In addition, it carried out in the ordinary temperature normal-relative-humidity (about 20-degree-C, 40%RH) environment, using acid paper as a form of continuation printing. Furthermore, in addition to ordinary temperature normal relative humidity, quality-of-image evaluation was performed also with high-humidity/temperature (about 28 degrees C, 85%RH). These are the acceleration evaluation methods for making easy to detect quality-of-image degradation by adhesion of the paper powder on the front face of a photo conductor. A result is shown in Table 32.

[0158]

[Table 32]

	画質評価				摩耗量 (μ m)
	初期		5万枚印刷後		
	常温常湿	高温高湿	常温常湿	高温高湿	
実施例1	良好	良好	良好	良好	0.8
実施例2	良好	良好	良好	良好	1.5
実施例3	良好	良好	良好	良好	1.0
実施例4	良好	良好	良好	良好	1.2
実施例5	良好	良好	良好	良好	0.8
実施例6	良好	良好	良好	良好	0.9
実施例7	良好	良好	良好	良好	1.2
実施例8	良好	良好	良好	良好	0.8
実施例9	良好	良好	良好	良好	2.0
実施例10	良好	良好	良好	良好	1.5
実施例11	良好	良好	良好	良好	0.9
実施例12	良好	良好	良好	良好	1.2
実施例13	良好	良好	良好	良好	0.8
実施例14	良好	良好	良好	良好	1.2
比較例1 (酸化防止剤なし)	良好	良好	良好	濃度むら発生	0.7
比較例2 (フッ素原子なし)	良好	良好	良好	濃度むらと 画像欠陥発生	0.75
比較例3 (表面保護層なし)	良好	良好	画像欠陥が 発生	画像ぼけが 発生	10.2

[0159] From Table 32, when the electrophotography photo conductor of examples 1-14 was used, it had the good quality of printed character (resolution, gradation nature) by all examinations. In quality-of-image evaluation of the high-humidity/temperature after an examination, picture concentration nonuniformity had generated the electrophotography photo conductor of the example 1 of comparison. It is expected to be the cause by the slight ozone which generates this by electrification that the surface-protection layer has received degradation. When the electrophotography photo conductor of the example 2 of comparison was used, in quality-of-image evaluation of the high-humidity/temperature after an examination, picture defects, such as picture concentration nonuniformity and picture *****, and picture dotage, were seen. Surface electrical resistance falls partially and this is considered to be because for the defect to have arisen in the electrostatic latent image, when paper powder, such as talc, adheres to a photo conductor front face. Moreover, as for the example 3 of comparison which does not have a protective layer, it turns out that a picture defect occurs after the examination of ordinary temperature normal relative humidity, and it takes to print durability.

[0160]

[Effect of the Invention] As mentioned above, this invention does not have an environmental dependency and the resistance over affixes, such as a photoelectrical property, a mechanical strength, resistance over a oxidizing gas, and paper powder, etc. can offer the electrophotography photo conductor which was excellent in the print durability which can cross a quality picture to a long period of time highly, and the image formation equipment which used it for the

row.

[Translation done.]

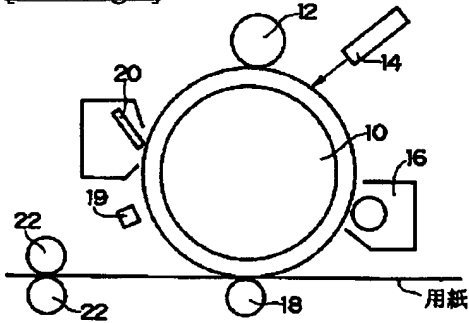
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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平11-184106

(43) 公開日 平成11年(1999) 7月9日

(51) Int.Cl.⁶

識別記号

F I

G 0 3 G 5/05

1 0 4

G 0 3 G 5/05

1 0 4 B

5/06

3 1 2

5/06

3 1 2

3 7 1

3 7 1

15/02

1 0 1

15/02

1 0 1

審査請求 未請求 請求項の数12 O L (全 45 頁)

(21) 出願番号

特願平9-349853

(22) 出願日

平成9年(1997)12月18日

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(54) 【発明の名称】 電子写真感光体、および画像形成装置

(57) 【要約】

【課題】 環境依存性がなく、および光電特性、機械的強度、酸化性ガスに対する耐性、及び紙粉などの付着物に対する耐性等が高く、かつ高品質の画像を長期に渡り得ることができる耐刷性に優れた電子写真感光体、並びにそれを用いた画像形成装置を提供。

【解決手段】 導電性支持体上に感光層を有する電子写真感光体において、感光層が下記一般式(Ⅰ)で表される化合物を含有しており、さらに、フッ素原子含有化合物および酸化防止剤を含有していることを特徴とする電子写真感光体である。下記式中、Gは無機ガラス質ネットワークサブグループ、Dは可とう性有機サブユニット、Fは光電特性サブユニットを示す。

【化1】

G — D — F

一般式(Ⅰ)

【特許請求の範囲】

【請求項 1】 導電性支持体上に感光層を有する電子写真感光体において、感光層が下記一般式 (I) で表される化合物、フッ素原子含有化合物および酸化防止剤を含有していることを特徴とする電子写真感光体。

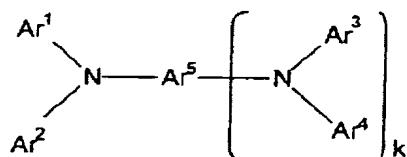
【化 1】



(式中、Gは無機ガラス質ネットワークサブグループ、Dは可とう性有機サブユニット、Fは光電特性サブユニットを示す)

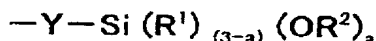
【請求項 2】 前記一般式 (I) の化合物が感光層中で架橋構造を形成していることを特徴とする請求項 1 に記載の電子写真感光体。

【請求項 3】 前記フッ素含有化合物が一般式 (I) の化合物と G で表される無機ガラス質ネットワークサブグループを介して結合可能なものであり、一般式 (I) で*



(式中、 $\text{Ar}^1 \sim \text{Ar}^4$ は、それぞれ独立に置換あるいは未置換のアリール基を表し、 Ar^5 は、置換あるいは未置換のアリール基あるいはアリーレン基を表し、かつ $\text{Ar}^1 \sim \text{Ar}^5$ のうち 1 ～ 4 個は、G-D で表される置換基を有し、k は 0 または 1 を表す。)

※



(式中、 R^1 は、水素、アルキル基、置換あるいは未置換のアリール基を表し、 R^2 は、水素、アルキル基、トリアルキルシリル基を表し、a は 1 ～ 3 の整数を表し、Y は、ヘテロ原子に直接結合した水素原子を含まない 2 価の基を示す。)

【請求項 8】 前記一般式 (III) 中の Y が、 $-C_xH_{2x}-$ (x は 1 ～ 15 の整数を表す。)、 $-C_{x'}H_{2x'-2}-$ (x' は 2 ～ 15 の整数を表す。)、 $-C_{x''}H_{2x''-4}-$ (x'' は 2 ～ 15 の整数を表す。)、置換あるいは未置換の 2 価のアリール基、 $-CH=N-$ 、 $-O-$ 、および $-COO-$ からなる群より選ばれた少なくとも 1 種以上を含有し、かつヘテロ原子に直接結合した水素原子を含まない 2 価の基であることを特徴と

*表される化合物とフッ素含有化合物とが感光層中で架橋構造を形成していることを特徴とする請求項 1 または 2 に記載の電子写真感光体。

【請求項 4】 前記一般式 (I) で表される化合物、フッ素原子含有化合物および酸化防止剤を含有する層が、感光層の最表面にあることを特徴とする請求項 1 乃至 3 のいずれか 1 項に記載の電子写真感光体。

【請求項 5】 前記酸化防止剤が、一般式 (I) で表される化合物を含有しない層にも含まれることを特徴とする、請求項 1 乃至 4 のいずれか 1 項に記載の電子写真感光体。

【請求項 6】 前記一般式 (I) で表される化合物が下記一般式 (II) で表される化合物であることを特徴とする請求項 1 乃至 5 のいずれか 1 項に記載の電子写真感光体。

【化 2】

一般式 (II)

※【請求項 7】 前記一般式 (I) で表される化合物中の G-D が、下記一般式 (III) で表されることを特徴とする請求項 1 乃至 6 のいずれか 1 項に記載の電子写真感光体。

【化 3】

一般式 (III)

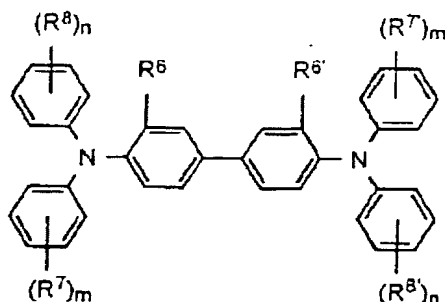
する請求項 7 の電子写真感光体。

【請求項 9】 前記感光層が、ハロゲン化ガリウムフタロシアニン、あるいはヒドロキシガリウムフタロシアニン、オキシチタニウムフタロシアニン、およびハロゲン化錫フタロシアニン、から選ばれる群の中の少なくとも 1 種以上含有することを特徴とする請求項 1 乃至 8 のいずれか 1 項に記載の電子写真感光体。

【請求項 10】 前記感光層が、下記一般式 (IV) で表されるベンジジン系化合物および下記一般式 (V) で表されるトリアリールアミン系化合物から選ばれる 1 種以上を含有することを特徴とする請求項 1 乃至 9 のいずれか 1 項に記載の電子写真感光体。

【化 4】

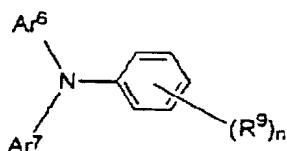
化合物 (IV)



(式中、 R^6 および $R^{6'}$ は、水素原子、ハロゲン原子、炭素数 1～5 のアルキル基、炭素数が 1～5 のアルコキシ基を表し、同一であってもよく、異なっているもよい。 R^7 、 $R^{7'}$ 、 R^8 および $R^{8'}$ は、水素原子、ハロゲン原子、炭素数 1～5 のアルキル基、炭素数 1～5 のアルコキシ基、炭素数 1～2 のアルキル基で置換された置換アミノ基を表し、同一であってもよく、異なっているもよい。 m および n は 0～2 の整数を表す。)

【化 5】

化合物(V)



(式中、 R^9 は、水素原子またはメチル基を表し、 n は 1 または 2 を表す。 Ar^6 および Ar^7 は、置換あるいは無置換のアリール基を表し、該置換基としては、ハロゲン原子、炭素数 1～5 のアルキル基、炭素数が 1～5 のアルコキシ基、炭素数 1～2 のアルキル基で置換された置換アミノ基を表す。)

【請求項 11】 少なくとも電子写真感光体、およびその帯電手段ならびに機械的なクリーニング手段を有する電子写真画像形成装置において、該電子写真感光体が請求項 1 乃至 10 のいずれか 1 項に記載の電子写真感光体であり、かつ帯電手段が接触帯電方式であることを特徴とする電子写真画像形成装置。

【請求項 12】 前記接触帯電方式に用いる帯電電圧が交流成分を有することを特徴とする請求項 11 に記載の電子写真画像形成装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、複写機、プリンター、ファクシミリなど、広い分野に適用される電子写真感光体、その製造方法、およびそれを用いた電子写真画像形成装置に関する。

【0002】

【従来の技術】従来、電子写真装置例えば普通紙複写機 (PPC)、レーザープリンター、LED プリンター、液晶プリンター等は、回転ドラム型等の感光体に帯電、露光、現像の作像プロセスを適用して像形成し、転写材に転写後定着して複写物を得る。これらに用いられる感

10 光体としてはセレンウム、ヒ素-セレンウム、硫化カドミウム、酸化亜鉛、 $a-Si$ 等の無機系感光体が用いられているが、安価で製造性および廃棄性の点で優れた有機感光体 (OPC) の研究開発も活発化しており、中でも電荷発生層と電荷輸送層を積層した、いわゆる機能分離型積層感光体が、感度、帯電性およびその繰り返し安定性等の電子写真特性の点で優れており種々の提案がなされ、実用化されている。

【0003】しかしながら、電子写真感光体に要求される耐久性は年々厳しいものとなっており、繰り返し使用による表面層の摩耗および傷、特に接触帯電下の使用で著しく増大される表面層の摩耗および傷、コロナ帯電器から発生するオゾンなどの酸化性ガスによる表面層の酸化劣化、等の問題に対して、耐久性向上に必要な技術の検討が続けられている。

【0004】最近になり、酸化性ガスの発生が少なくなる、および電源コストが抑えられるなどの理由から、接触帯電方式を用いた複写機やプリンターが増えている。しかし、感光体の帯電電位を安定させるために交流成分を有する印加電圧を用いた場合、感光体表面の摩耗が大きくなってしまいう問題があった。この原因としては、感光体表面と接触帯電器の間に発生する放電により、感光体表面の結着樹脂の結合が切断されて低分子量化すること、などが考えられている。感光体表面の結着樹脂が低分子量化すると、クリーニングブレードなどの機械的クリーニングを行っている場合、摩耗が著しく増大してしまうことがわかっている。

【0005】感光体の摩耗を低減させる方法として、感光体表面に機械的強度の高い表面保護層を施すというものがある。機械的強度の面からは架橋硬化性樹脂が優れているが、架橋性樹脂のみで構成すると表面保護層は絶縁層となってしまうため、感光体としての光電特性が犠牲になっていた。具体的には、露光時の明部電位が上昇することにより、現像電位マージンが狭くなる問題、および除電後の残留電位が上昇することにより、特に長期の繰り返し印刷を行なった場合に画像濃度が低下する問題、などがあった。

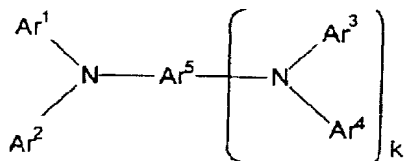
【0006】光電特性を付与する手法として、導電性の金属酸化物微粉末を抵抗制御材として表面保護層中に分散する方法が報告されている (特開昭 57-128341 号公報)。この方法による感光体光電特性の低下は小

さく、上記にあげた問題は顕著に改善される。しかし、一般に導電性微粉末として用いる金属酸化物の抵抗値は、環境の湿度に大きく依存するという問題がある。そのため、特に高温高湿下において感光体表面抵抗が低下し、静電潜像がぼやけることによって画像品位が大きく低下してしまうという本質的な問題があった。

【0007】光電特性を改良する他の手法として、結着樹脂中に電荷輸送物質を分散し、その後結着樹脂を硬化させて表面保護層を形成するという方法が報告されている（特開平4-15659号公報）。この方法では感光体表面抵抗が湿度依存を示すことも無く、画像品位上の問題はなかった。しかし、電荷輸送物質という低分子量成分の添加は硬化反応を阻害し、表面保護層の機械的強度を低下させる。よって、単独では機械的強度の高い架橋硬化性樹脂を用いたとしても、光電特性の改良に必須の電荷輸送物質という低分子成分を添加することで表面保護層の機械強度は大きく低下してしまうという問題点があった。

【0008】このような観点から、官能基を有する電荷輸送物質を用いて、これを熱可塑性の結着樹脂と反応させることにより表面層の機械的強度の向上を計るという報告がされている（特開平6-202354号公報、特開平5-323630号公報）。この方法によれば、感光体の光電特性を低下させずに、十分な機械的強度を初期的には得ることができる。しかし、これらの表面層構成では、接触帯電で長期間使用された場合、機械的強度の急激な低下が起こるという問題点があった。この原因はやはり、接触帯電における交流電圧印加による熱可塑性結着樹脂の結合の切断、といった強い外的ストレスによるものであると考えられており、クリーニングブレードなどの機械的クリーニングを用いていると摩耗が非常に増大してしまう。

【0009】感光体の磨耗の問題に加え、酸化性ガスに対する耐性も要求される。すなわち、接触帯電方式を用いるとスコロトン放電に比べて発生するオゾンやNO



【0017】一般式（II）中、 $\text{Ar}^1 \sim \text{Ar}^4$ は、それぞれ独立に置換あるいは未置換のアリール基を表し、 Ar^5 は、置換あるいは未置換のアリール基あるいはアリーレン基を表し、かつ $\text{Ar}^1 \sim \text{Ar}^5$ のうち1～4個は、G-D-Fで表される置換基を有し、 k は0または1を表す。

【0018】また、好ましい形態として、前記一般式（I）の化合物が感光層中で架橋構造を形成していることが好適であり、また、前記フッ素含有化合物が一般式

Ⅱの量ははるかに少ないとはいえ、交流成分を有する印加電圧を用いる場合には必ずこれらの酸化性ガスが発生する。感光体表面の機械的強度を向上させることで寿命を延ばそうとすると、発生した酸化性ガスが長い時間感光体に影響を及ぼすことになるため、従来以上の酸化性ガスに対する耐性が求められる。

【0010】さらに、これらの問題点に加えて、単に表面保護層の機械的強度のみを高めようとする、感光体表面に紙粉やトナーが付着しやすくなり、その結果画像品質を低下させてしまうという問題も起こる。

【0011】

【発明が解決しようとする課題】本発明の目的は、環境依存性がなく、光電特性、機械的強度、酸化性ガスに対する耐性、および紙粉などの付着物に対する耐性等が高く、かつ高品質の画像を長期にわたり得ることができる耐刷性に優れた電子写真感光体、ならびにそれを用いた画像形成装置を提供することである。

【0012】

【課題を解決するための手段】本発明者らは、感光層中に下記一般式（I）で表される化合物、フッ素原子含有化合物および酸化防止剤を含有させることにより、上記問題が解決できることを見出した。特に、この感光体を接触帯電方式と機械的クリーニング手段を有する電子写真画像形成装置に用いた場合、耐刷性を飛躍的に向上させることができる。

【0013】

【化6】

G-D-F 一般式（I）

【0014】（式中、Gは無機ガラス質ネットワークサブグループ、Dは可とう性有機サブユニット、Fは光電特性サブユニットである）

【0015】一般式（I）で表される化合物が、下記一般式（II）で表される化合物であることが好ましい。

【0016】

【化7】

一般式（II）

（I）の化合物とGで表される無機ガラス質ネットワークサブグループを介して結合可能なものであり、一般式（I）で表される化合物とフッ素含有化合物とが感光層中で架橋構造を形成していることが好ましい。

【0019】さらに、前記一般式（I）で表される化合物、フッ素原子含有化合物および酸化防止剤を含有する層が、感光層の最表面にある層であることが好ましく、前記酸化防止剤が、一般式（I）で表される化合物を含有しない層にも含有されることが好ましい。

【0020】

【発明の実施の形態】以下、本発明の電子写真感光体について詳細に説明する。本発明の電子写真感光体は、導電性支持体上に少なくとも感光層を有し、必要に応じて、下引き層、保護層等のその他の層を有する。

【0021】（導電性支持体）本発明に用いる導電性支持体としては、一般に電子写真感光体の導電性支持体として用いられているものであれば特に制限はなく、例えば、アルミニウム、ニッケル、クロム、ステンレス鋼等の金属類、アルミニウム、チタニウム、ニッケル、クロム、ステンレス、金、バナジウム、酸化錫、酸化インジウム、ITO等の薄膜を設けたプラスチックフィルム、導電性付与剤を塗布乃至は含浸させた紙及びプラスチックフィルムなどが挙げられる。

【0022】前記導電性支持体には、画質に影響のない範囲で必要に応じて各種の処理等を行うことができる。このような処理としては、例えば、前記導電性支持体の表面の陽極酸化被膜処理、熱水酸化処理、薬品処理、着色処理、砂目立てなどの乱反射処理などが挙げられる。前記導電性支持体の形状としては、特に制限はなく、目的に応じて適宜選択することができ、例えば、ドラム状、シート状、プレート状等が挙げられる。

【0023】（下引き層）前記導電性支持体の一方の表面には感光層が設けられるが、本発明においては、該導電性支持体と該感光層との間に下引き層を好適に設けることができる。電子写真感光体に前記下引き層が設けられていると、該下引き層が、前記感光層の帯電時において、前記導電性支持体から前記感光層への電荷の注入を阻止すると共に、該感光層を該導電性支持体に対して一体的に接着させ、保持させる接着層としての作用乃至は、場合によっては該導電性支持体の光の反射光防止作用等を示すことができる点で有利である。

【0024】前記下引き層としては、一般に電子写真感光体の下引き層に用いられている材質で形成することができ、例えば、少なくとも結着樹脂を含んでなり、更に必要に応じて微粒子等を含んでなる。前記結着樹脂としては、特に制限はなく、目的に応じて適宜選択することができるが、例えば、ポリアミド樹脂、塩化ビニル樹脂、酢酸ビニル樹脂、フェノール樹脂、ポリウレタン樹脂、メラミン樹脂、ベンゾグアナミン樹脂、ポリイミド樹脂、ポリエチレン樹脂、ポリプロピレン樹脂、ポリカーボネート樹脂、アクリル樹脂、メタクリル樹脂、塩化ビニリデン樹脂、ポリビニルアセタール樹脂、塩化ビニル-酢酸ビニル共重合体、ポリビニルアルコール樹脂、水溶性ポリエステル樹脂、ニトロセルロース、カゼイン、ゼラチン、ポリグルタミン酸、澱粉、スターチアセテート、アミノ澱粉、ポリアクリル酸、ポリアクリルアミド、ジルコニウムキレート化合物、チタニウムキレート化合物、チタニウムアルコキシド化合物、有機チタニウム化合物、シランカップリング剤などが挙げられる。これら

は、1種単独で使用してもよいし、2種以上を併用してもよい。前記微粒子としては、例えば、酸化チタン、酸化アルミニウム、酸化珪素、酸化ジルコニウム、チタン酸バリウム、シリコン樹脂などが挙げられる。これらは、1種単独で使用してもよいし、2種以上を併用してもよい。

【0025】前記下引層を形成する際の塗布方法としては、特に制限はないが、例えば、ブレードコーティング法、マイヤーバーコーティング法、スプレーコーティング法、浸漬コーティング法、ビードコーティング法、エアナイフコーティング法、カーテンコーティング法などの通常の塗布方法が挙げられる。前記下引層の厚みとしては、通常、0.01~10 μ mであり、0.05~2 μ mが好ましい。

【0026】（感光層）本発明の電子写真感光体は、導電性支持体上に感光層を設けてなり、該感光層が、下記一般式（I）で表される化合物、フッ素原子含有化合物及び酸化防止剤を含有している。該感光層は、単層型であってもよいし、電荷発生層と電荷輸送層等とに機能分離された積層型であってもよい。

【0027】

【化8】



【0028】一般式（I）中、Gは無機ガラス質ネットワークサブグループを表す。無機ガラス質ネットワークサブグループとは、金属酸化物の結合を有するものであり、末端の反応基によって、他の無機ガラス質ネットワークサブグループと結合を繰り返し、無機ガラス質ネットワークを形成しうるものである。具体的には、アルコキシド、酸、塩化物のように加水分解および縮合を受け得る任意の無機物質から得ることができ、好ましくは、Si、Al、Ti、Cu、Fe、As、Se、Teなどの原子に炭素数1~20程度のアルコキシドまたはアリールオキシド基を有する化合物を用いることで導入することができる。また、一般式（I）で表される化合物中のGで表される無機ガラス質ネットワークサブグループを介して結合しうる化合物は、別の、結合する化合物と同じでも異なってもよい一般式（I）で表される化合物から選択されたものであってもよいし、単に、一般式（I）で表される化合物中のGで表される無機ガラス質ネットワークサブグループと結合しうる、他の化合物であってもよい。ここで結合しうる他の化合物としては、公知の有機金属化合物を用いることができ、ジルコニウムキレート化合物、ジルコニウムアルコキシド化合物、ジルコニウムカップリング剤、等の有機ジルコニウム化合物、チタンキレート化合物、チタンアルコキシド化合物、チタネートカップリング剤、等の有機チタン化合物、アルミニウムキレート化合物、アルミニウムカップリング剤、等の有機アルミニウム化合物、アルミニウムシリコンアルコキシド、アルミニウムチタンアルコ

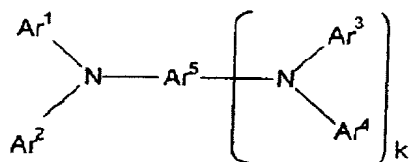
キシド、等が挙げられる。また、ビニルトリクロロシラン、ビニルトリメトキシシラン、ビニルトリス-2-メトキシエトキシシラン、ビニルトリアセトキシシラン、γ-グリシドシキプロピルトリメトキシシラン、γ-メタクリロキシプロピルトリメトキシシラン、γ-アミノプロピルトリエトキシシラン、等のシランカップリング剤も好ましく使用でき、これらは所望の感光層の特性を得るために適宜選択しうる。

【0029】一般式(I)で表される化合物同士がGで表される無機ガラス質ネットワークサブグループを介して感光層中で架橋構造の少なくとも一部を形成していることにより、単位体積中の結合エネルギーが大きくなり、放電や機械的接触などの強いストレスに対する耐性が高くなる。さらに、万一これらのストレスにより結合の一部が切断されたとしても、架橋構造を形成しているため直ちに低分子量化することではなく、よって機械的強度がすぐに失われることもなくなる。

【0030】一般式(I)中、Dは可とう性有機サブユニットを表す。可とう性有機サブユニットとは、架橋構造を形成するGで表される無機ガラス質ネットワークサブグループとFで表される光電特性サブユニットとを結合させるための連結部であり、具体的には、 $-C_n H_{2n}-$ (nは1~15の整数を表す。)、 $-C_{n'} H_{2n'-2}-$

(n'は2~15の整数を表す。)、 $-C_{n''} H_{2n''-4}-$ (n''は2~15の整数を表す。)、 $-COO-$ 、 $-S-$ 、 $-O-$ 、 $-CH_2-C_6H_4-$ 、 $-CH=N-$ 、 $-(C_6H_4)-(C_6H_4)-$ 、またはこれらの組み合わせや置換基を導入したもの等を表す。

【0031】一般式(I)中、Fは光電特性サブユニットを表す。光電特性サブユニットとは、前述のように光キャリア輸送特性を有するユニットであり、従来、電荷輸送物質として知られている構造をそのまま用いることができる。具体的には、トリアリールアミン系化合物、*



【0036】一般式(II)中、 $\text{Ar}^1 \sim \text{Ar}^5$ は、それぞれ独立に置換あるいは無置換のアリール基を表し、 Ar^5 は、置換あるいは未置換のアリール基あるいはアリーレン基を表し、且つ、 $\text{Ar}^1 \sim \text{Ar}^5$ のうち1~4個は、G-Dで表される置換基を有しており、kは、0または1を表す。

*ベンジン系化合物、アリールアルカン系化合物、アリール置換エチレン系化合物、スチルベン系化合物、アントラセン系化合物、ヒドラゾン系化合物、等の正孔輸送性を有する化合物の骨格、及びキノン系化合物、フルオレノン系化合物、キサントン系化合物、ベンゾフェノン系化合物、シアノビニル系化合物、エチレン系化合物、等の電子輸送性を有する化合物の骨格を用いることができる。本発明の感光体においては、一般式(I)で表される化合物がFで表される光電特性サブユニットを有しており、且つ、好ましくはこれがGで表される無機ガラス質ネットワークサブグループを介して、架橋構造の少なくとも1部に直接結合しているため、架橋構造の機械的強度特性を失うことなく、光電特性を付与することが可能となる。つまり、一般式(I)で表される化合物を含む層は、その機械的特性から感光体表面の表面保護層として使用可能なだけでなく、積層型感光体の電荷輸送層としても機能することができる。

【0032】本発明は、上記一般式(I)で表される化合物の特性に加えて、酸化防止剤を添加することにより、酸化防止剤の酸化防止効果で耐酸化性を向上させることができる。また、フッ素含有化合物の添加により、フッ素含有化合物の持つ潤滑性、低付着性等により、感光体の耐付着性を向上させることができる。

【0033】本発明において、無機ガラス質ネットワークサブグループ、可とう性有機サブユニットおよび光電特性サブユニットの「サブ」とは、一般式(I)で表される化合物を構成するグループもしくはユニット、と言う意味で用いる。

【0034】本発明において、感光層に用いられる一般式(I)で表される化合物が、下記一般式(II)で表される化合物であることが好ましい。

【0035】

【化9】

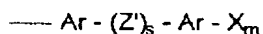
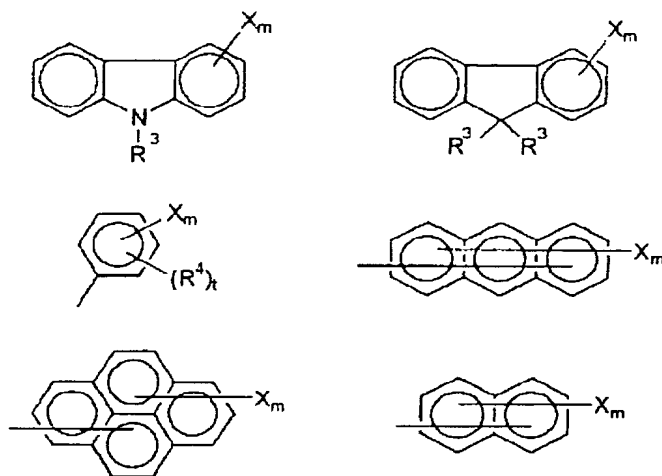
一般式(II)

【0037】一般式(II)中、 $\text{Ar}^1 \sim \text{Ar}^4$ は、それぞれ独立に置換または未置換のアリール基を示し、具体的には、下記構造群1に示す基が挙げられる。

【0038】

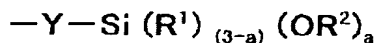
【化10】

構造群1



【0039】構造群1の構造式中、 R^3 は、水素、炭素数1～4のアルキル基、炭素数1～4のアルキル基もしくは炭素数1～4のアルコキシ基で置換されたフェニル基、または未置換のフェニル基、炭素数7～10のアラルキル基を表し、 R^4 は、水素、炭素数1～4のアルキル基、炭素数1～4のアルコキシ基、またはハロゲンを表し、 m および s は0または1を表し、 t は1から3の整数を表す。 Z' は、下記構造群2に示す基から選択される。

【0040】



【0043】一般式(III)中、 R^1 は水素、アルキル基、置換あるいは未置換のアリール基を表し、 R^2 は水素、アルキル基、トリアルキルシリル基を表し、 a は1～3の整数を表し、 Y はヘテロ原子に直接結合した水

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【化11】

構造群2



【0041】構造群1の構造式中、 X は、 $G-D$ で表される置換基であり、下記一般式(III)で表される置換基が好ましい。

【0042】

【化12】

一般式(III)

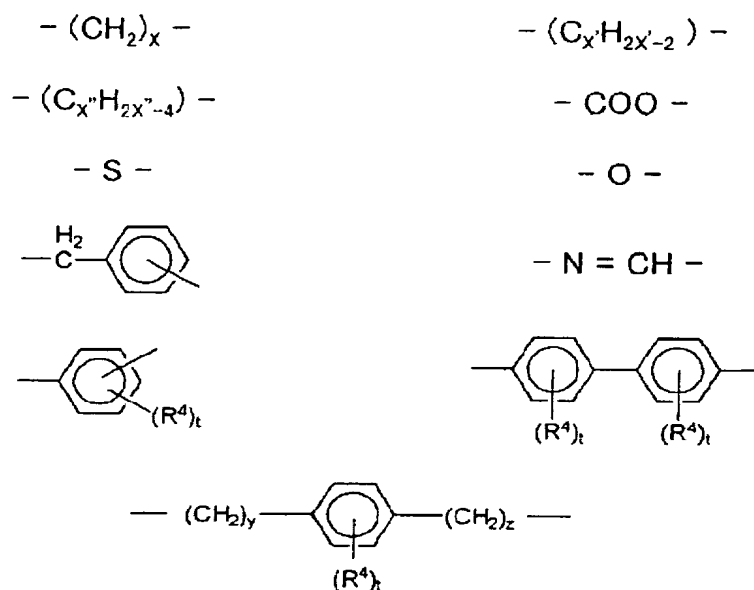
素原子を含まない2価の基を表す。 Y の具体例としては、下記構造群3に示す基が挙げられる。

【0044】

【化13】

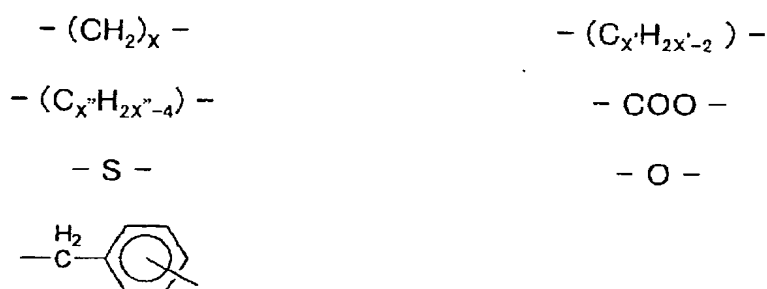
30

構造群3



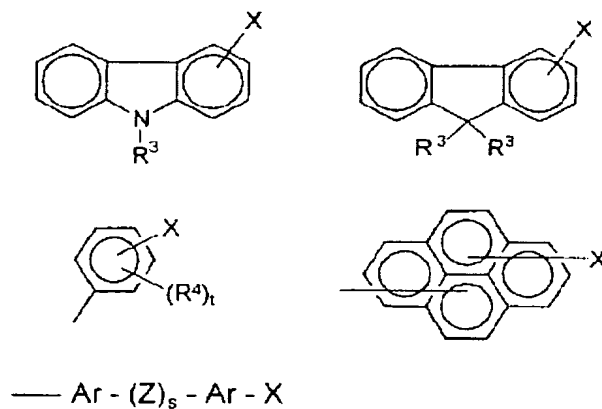
【0045】構造群3の構造式中、 x は1～10の整数、 x' および x'' はそれぞれ2～15の整数、 y および z はそれぞれ1～5の整数を表す。この中でも特に、*

構造群4



【0047】一般式(II)中、 Ar^5 は、置換もしくは未置換のアリール基または、アリーレン基を表し、 $k=0$ のときの具体的には、下記構造式5に示す基が挙げ※

構造群5



20*下記構造式4に示す基が好ましい。

【0046】

【化14】

※られる。

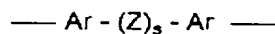
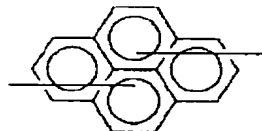
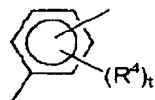
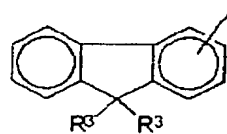
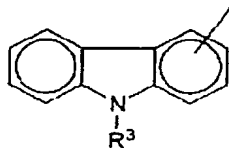
【0048】

【化15】

【0049】また、一般式 (I I) 中、 $k=1$ のときの Ar^5 の具体的には、下記構造群 6 に示す基が挙げられる。

*

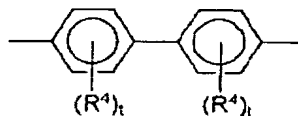
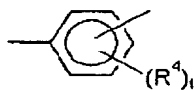
構造群 6



【0051】構造群 5 及び 6 の構造式中、 Ar は下記構造式 7 に示す基から選択される。

※

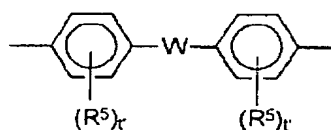
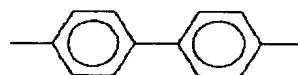
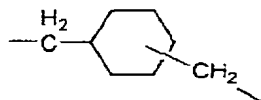
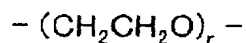
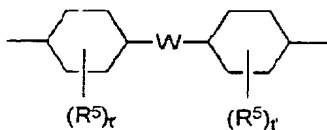
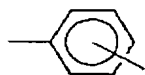
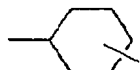
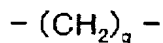
構造群 7



【0053】また、 Z は下記構造群 8 に示す基から選択される。

★

構造群 8



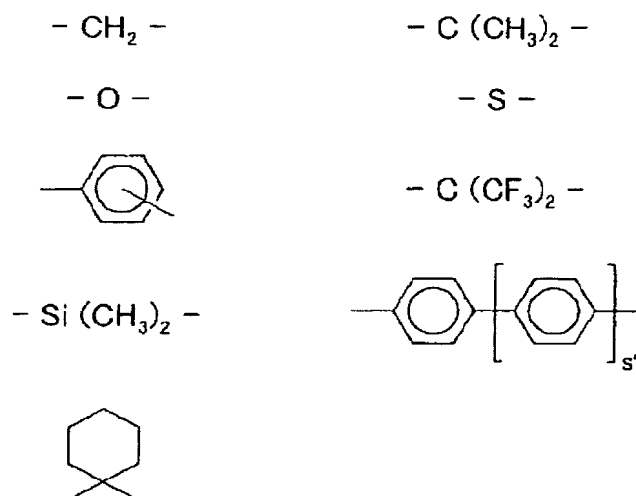
【0055】構造群 8 の構造式中、 R^5 は、水素、炭素数 1~4 のアルキル基、炭素数 1~4 のアルコキシ基、ハロゲンから選択される。また q および r はそれぞれ 1~10 の整数、 t は 1 または 2 の整数を示し、 W は下

記構造群 9 に示す基から選択される。

【0056】

【化 19】

構造群9

































【0057】構造群9の構造式中、 s' は0～3の整数を表す。

【0058】以下の表1～25に、一般式(I)の例示化合物、「化合物1～化合物256」を一般式(I)に*20

*おける具体的な官能基を示すことにより挙げるが、しかし、本発明は、これらに限られるものではない。



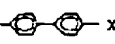


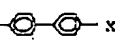


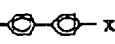


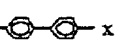


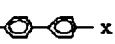


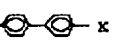


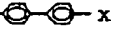


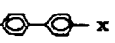


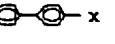
【0059】

【表1】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
1	0			—	—		$-\text{CH}=\text{N}-\text{CH}_2-$ $-\text{Si}(\text{OMe})_2\text{Me}$
2	0			—	—		$-\text{CH}=\text{N}-(\text{CH}_2)_3-$ $-\text{Si}(\text{OMe})_3$
3	0			—	—		$-\text{CH}=\text{N}-(\text{CH}_2)_3-$ $-\text{Si}(\text{OEt})_2$
4	0			—	—		$-\text{CH}=\text{N}-$ $(\text{CH}_2)_2-\text{Si}(\text{OMe})_2$
5	0			—	—		$-\text{CH}=\text{N}-$ $-\text{Si}(\text{OMe})_2$
6	0			—	—		$-\text{O}-(\text{CH}_2)_3-$ $-\text{Si}(\text{OMe})_3$
7	0			—	—		$-\text{O}-(\text{CH}_2)_3-$ $-\text{SiMe}(\text{OMe})_2$
8	0			—	—		$-\text{O}-(\text{CH}_2)_3-$ $-\text{Si}(\text{OEt})_2$
9	0			—	—		$-\text{CH}_2-\text{O}-(\text{CH}_2)_3-$ $-\text{Si}(\text{OMe})_2$
10	0			—	—		$-(\text{CH}_2)_3\text{O}-(\text{CH}_2)_3-$ $-\text{Si}(\text{OMe})_2$

【0060】

【表2】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
11	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
12	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
13	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
14	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
15	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
16	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
17	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
18	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
19	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$

【0061】

【表3】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
20	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
21	0			—	—		$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
22	0			—	—		$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
23	0			—	—		$-\text{CH}_2\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
24	0			—	—		$-\text{CH}_2\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
25	0			—	—		$-\text{CH}_2\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
26	0			—	—		$-(\text{CH}_2)_7\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
27	0			—	—		$-(\text{CH}_2)_7\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
28	0			—	—		$-(\text{CH}_2)_7\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$





































【0062】

* * 【表4】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
29	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
30	0			—	—		$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
31	0			—	—		$-(\text{CH}_2)_7\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
32	0			—	—		$-(\text{CH}_2)_7\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
33	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
34	0			—	—		$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
35	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
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





























【0063】

* * 【表 5】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
37	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
38	0			—	—		$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
39	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
40	0			—	—		$-\text{CH}_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
41	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
42	0			—	—		$-(\text{CH}_2)_7-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
43	0			—	—		$-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
44	0			—	—		$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
45	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
46	0			—	—		$-\text{CH}_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
47	0			—	—		$-(\text{CH}_2)_7-\text{COO}-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$
48	0			—	—		$-(\text{CH}_2)_7-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_7-\text{Si}(\text{OMe})_3$































【0064】

【表 6】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
49	0			—	—		-CH=CH-Si(OR) ₂
50	0			—	—		-CH=CH-CH ₂ - Si(OR) ₂
51	0			—	—		-CH=CH-(CH ₂) ₂ - Si(OMe) ₂
52	0			—	—		-CH=CH-(CH ₂) ₂ - SiMe(OMe) ₂
53	0			—	—		-CH=CH-CH ₂ - Si(OMe) ₂ Me
54	0			—	—		-CH=CH-(CH ₂) ₃ - Si(OR) ₂
55	0			—	—		-CH=CH-(CH ₂) ₁₀ - Si(OMe) ₂
56	0			—	—		-CH=CH-C ₆ H ₄ - Si(OMe) ₂
57	0			—	—		-CH=CH-C ₆ H ₄ - (CH ₂) ₇ -Si(OMe) ₂
58	0			—	—		-CH=CH-(CH ₂) ₂ - Si(OMe) ₂





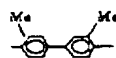









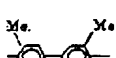









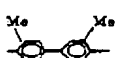




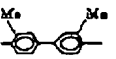









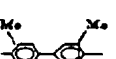










【0065】

【表7】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
59	0			—	—		$-(CH_2)_3-Si(OEt)_3$
60	0			—	—		$-(CH_2)_3-Si(OEt)_3$
61	0			—	—		$-(CH_2)_3-Si(OMe)_3$
62	0			—	—		$-(CH_2)_3-SiMe_2(OMe)_2$
63	0			—	—		$-(CH_2)_3-SiMe_2(OMe)_2$
64	0			—	—		$-(CH_2)_3-Si(OEt)_3$
65	0			—	—		$-(CH_2)_3-SiMe(OEt)_2$
66	0			—	—		$-(CH_2)_3-Si(OMe)_3$
67	0			—	—		$-(CH_2)_7-C_6H_4-$ $-(CH_2)_7-Si(OMe)_3$
68	0			—	—		$-CH_2-CH_2-C_6H_4-$ $-Si(OMe)_3$





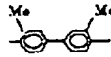




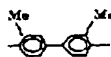




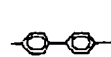
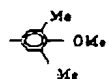


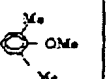

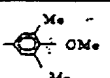


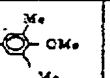
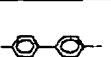




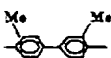




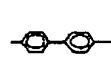
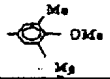


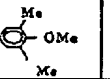

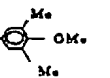


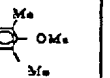
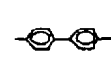




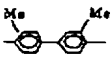
【0066】

【表8】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
69	1						$-\text{CH}=\text{N}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
70	1						$-\text{CH}=\text{N}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
71	1						$-\text{CH}=\text{N}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
72	1						$-\text{CH}=\text{N}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
73	1						$-\text{CH}=\text{N}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
74	1						$-\text{CH}=\text{N}-$ $-\text{Si}(\text{OMe})_3$
75	1						$-\text{O}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
76	1						$-\text{O}-(\text{CH}_2)_3$ $-\text{Si}(\text{OEt})_3$
77	1						$-\text{CH}_2-\text{O}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
78	1						$-(\text{CH}_2)_3\text{O}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$































【0067】

【表9】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
79	1						$-(CH_2)_4-Si(OMe)_2$
80	1						$-(CH_2)_7-C_6H_4-Si(OMe)_2$
81	1						$-(CH_2)_4-Si(OMe)_2$
82	1						$-(CH_2)_4-Si(OMe)_2$
83	1						$-(CH_2)_4-Si(OMe)_2$
84	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
85	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
86	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
87	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
88	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$































【0068】

【表10】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
89	0			—	—		$-(CH_2)_7-Si(OEt)_2$
90	0			—	—		$-(CH_2)_7-Si(OEt)_3$
91	0			—	—		$-(CH_2)_7-Si(OMe)_2Me$
92	0			—	—		$-(CH_2)_7-Si(OMe)_3$
93	0			—	—		$-(CH_2)_7-Si(OMe)_2$
94	0			—	—		$-(CH_2)_7-Si(OEt)_3$
95	0			—	—		$-(CH_2)_7-C_6H_4-Si(OMe)_2$
96	0			—	—		$-(CH_2)_7-C_6H_4-(CH_2)_7-Si(OMe)_2$
97	0			—	—		$-(CH_2)_7-Si(OMe)_2$
98	0			—	—		$-(CH_2)_7-Si(OMe)_2$































【0069】

【表11】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
99	0			—	—		$-\text{CH}=\text{CH}-\text{Si}(\text{OEt})_2$
100	0			—	—		$-\text{CH}=\text{CH}-\text{CH}_2$ $-\text{Si}(\text{OMe})_2\text{Me}$
101	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2$ $-\text{Si}(\text{OMe})_2$
102	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_2\text{Me}$
103	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2$ $-\text{Si}(\text{Me})_2(\text{OMe})$
104	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_3$ $-\text{Si}(\text{OEt})_2$
105	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_{10}$ $-\text{Si}(\text{OMe})_2$
106	0			—	—		$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-$ $-\text{Si}(\text{OMe})_2$
107	0			—	—		$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-$ $(\text{CH}_2)_2-\text{Si}(\text{OMe})_2$
108	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2$ $-\text{Si}(\text{OMe})_2$

【0070】

【表12】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
109	0			—	—		-CH=N(CH ₂) ₂ -Si(OMe) ₃
110	0			—	—		-CH=N(CH ₂) ₂ -SiOEt ₃
111	0			—	—		-CH=N-CH ₂ - -Si(OMe) ₂ Me
112	0			—	—		-CH=N-C ₂ H ₄ - (CH ₂) ₂ -Si(OMe) ₃
113	0			—	—		-CH=N-(CH ₂) ₂ -Si(OMe) ₃
114	0			—	—		-O-(CH ₂) ₂ -Si(OMe) ₃
115	0			—	—		-O-(CH ₂) ₂ -SiOEt ₃
116	0			—	—		-CH ₂ -O-(CH ₂) ₂ -Si(OMe) ₃
117	0			—	—		-(CH ₂) ₂ -O-(CH ₂) ₂ -Si(OMe) ₃
118	0			—	—		-CH ₂ -O-(CH ₂) ₂ -Si(OMe) ₃



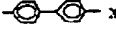

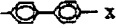




























【0071】

【表13】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
119	0			—	—		$-(CH_2)_7COO-(CH_2)_7Si(OMe)_3$
120	0			—	—		$-(CH_2)_7COO-(CH_2)_7Si(OMe)_3$
121	0			—	—		$-(CH_2)_7COO-CH_2C_6H_4-(CH_2)_7Si(OMe)_3$
122	0			—	—		$-(CH_2)_7COO-CH_2C_6H_4-(CH_2)_7Si(OMe)_3$
123	0			—	—		$-(CH_2)_7COO-(CH_2)_7Si(OMe)_3$
124	0			—	—		$-(CH_2)_7COO-CH_2C_6H_4-(CH_2)_7Si(OMe)_3$
125	0			—	—		$-(CH_2)_7COO-CH_2C_6H_4-(CH_2)_7Si(OMe)_3$
126	0			—	—		$-(CH_2)_7COO-(CH_2)_7Si(OMe)_3$
127	0			—	—		$-(CH_2)_7COO-CH_2C_6H_4Si(OMe)_3$
128	0			—	—		$-(CH_2)_7COO-CH_2C_6H_4-(CH_2)_7Si(OMe)_3$
129	0			—	—		$-(CH_2)_7COO-(CH_2)_7Si(OMe)_3$
130	0			—	—		$-(CH_2)_7COO-(CH_2)_7Si(OMe)_3$
131	0			—	—		$-(CH_2)_7COO-CH_2C_6H_4-(CH_2)_7Si(OMe)_3$





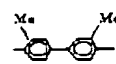




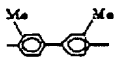




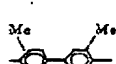









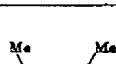




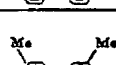




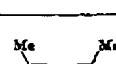




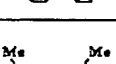




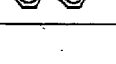




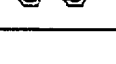
【0072】

【表14】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
132	0			—	—		$-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
133	0			—	—		$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
134	0			—	—		$-\text{CH}_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
135	0			—	—		$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
136	0			—	—		$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
137	0			—	—		$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
138	0			—	—		$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
139	0			—	—		$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
140	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
141	0			—	—		$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
142	0			—	—		$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$



















































【0073】

【表15】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
143	1						$-(CH_2)_7-Si(OEt)_3$
144	1						$-(CH_2)_7-Si(OEt)_3$
145	1						$-(CH_2)_7-Si(OMe)_3$
146	1						$-(CH_2)_7-SiMe_2(OMe)_2$
147	1						$-(CH_2)_7-SiMe_2(OMe)$
148	1						$-(CH_2)_7-Si(OEt)_3$
149	1						$-(CH_2)_7-C_6H_4-Si(OMe)_3$
150	1						$-(CH_2)_7-C_6H_4-Si(OMe)_3$
151	1						$-(CH_2)_7-Si(OMe)_2Me$
152	1						$-(CH_2)_7-Si(OMe)_3$





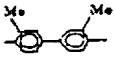




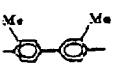




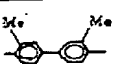




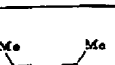




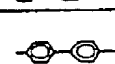




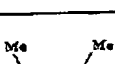




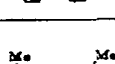




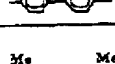




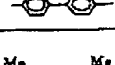




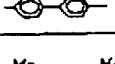
【0074】

【表16】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
153	1						$-\text{CH}=\text{CH}-\text{Si}(\text{OEt})_3$
154	1						$-\text{CH}=\text{CH}-\text{CH}_2-\text{Si}(\text{OMe})_2\text{Me}$
155	1						$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
156	1						$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{SiMe}_2(\text{OMe})_2$
157	1						$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{SiMe}_2(\text{OMe})$
158	1						$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{Si}(\text{OEt})_3$
159	1						$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
160	0						$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
161	1						$-\text{CH}=\text{CH}-\text{CH}_2-\text{Si}(\text{OMe})_2\text{Me}$
162	1						$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$





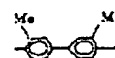




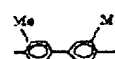














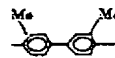









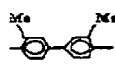




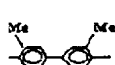



















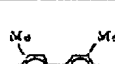
【0075】

【表 17】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
163	1						$\text{-CH=N-CH}_2\text{-Si(OMe)}_2\text{Me}$
164	1						$\text{-CH=N-(CH}_2\text{)}_2\text{-Si(OEt)}_3$
165	1						$\text{-CH=N-(CH}_2\text{)}_3\text{-SiOMe}_3$
166	1						$\text{-CH=N-}\langle\text{phenyl}\rangle\text{-Si(OMe)}_3$ $(\text{CH}_2)_2\text{-Si(OMe)}_3$
167	1						$\text{-CH=N-CH}_2\text{-Si(OMe)}_2\text{Me}$
168	1						$\text{-O-(CH}_2\text{)}_2\text{-Si(OMe)}_3$
169	1						$\text{-O-(CH}_2\text{)}_3\text{-SiMe(OMe)}_2$
170	1						$\text{-O-(CH}_2\text{)}_3\text{-Si(OEt)}_3$
171	1						$\text{-CH}_2\text{-O-(CH}_2\text{)}_3\text{-Si(OMe)}_3$
172	1						$\text{-(CH}_2\text{)}_3\text{-O-(CH}_2\text{)}_3\text{-Si(OMe)}_3$


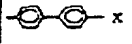
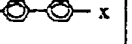

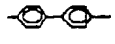

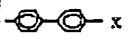
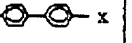

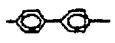

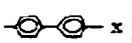
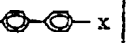

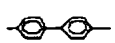
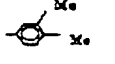
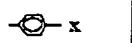
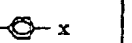
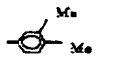
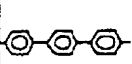
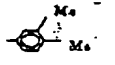
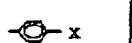
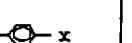
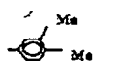
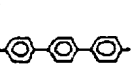
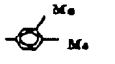
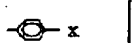
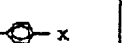
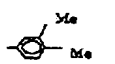
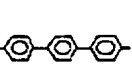
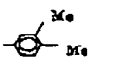
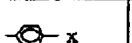
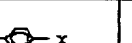
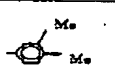
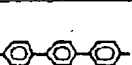
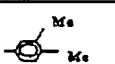

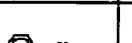
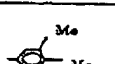

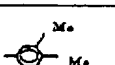
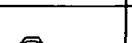
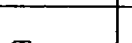

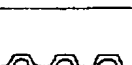
【0076】

【表18】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
173	1						$-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
174	1						$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
175	1						$-\text{CH}_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
176	1						$-\text{CH}_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
177	1						$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
178	1						$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
179	1						$-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
180	1						$-\text{CH}_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
181	1						$-\text{CH}_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
182	1						$-\text{CH}_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
183	1						$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
184	1						$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$































【0077】

【表19】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
185	1						-COO-(CH ₂) ₇ - Si(OMe) ₃
186	1						-COO-CH ₂ -C ₈ H ₄ - Si(OMe) ₃
187	1						-COO-CH ₂ -C ₈ H ₄ - (CH ₂) ₇ -Si(OMe) ₃
188	1						-COO-(CH ₂) ₇ - Si(OMe) ₃
189	1						-COO-CH ₂ -C ₈ H ₄ - Si(OMe) ₃
190	1						-COO-CH ₂ -C ₈ H ₄ - (CH ₂) ₇ -Si(OMe) ₃
191	1						-CH ₂ -COO-(CH ₂) ₇ - Si(OMe) ₃
192	1						-(CH ₂) ₇ -COO- (CH ₂) ₇ -Si(OMe) ₃
193	1						-(CH ₂) ₇ -COO- CH ₂ -C ₈ H ₄ -(CH ₂) ₇ - Si(OMe) ₃

【0078】

【表20】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
194	0			—	—		$-(CH_2)_3-Si(OMe)_2Me$
195	0			—	—		$-(CH_2)_3-Si(OEt)_3$
196	0			—	—		$-(CH_2)_6-Si(OMe)_3$
197	0			—	—		$-(CH_2)_6-SiMe_2(OMe)_2$
198	0			—	—		$-(CH_2)_6-SiMe_2(OMe)$
199	0			—	—		$-(CH_2)_6-Si(OEt)_3$
200	0			—	—		$-(CH_2)_{12}-Si(OMe)_3$
201	0			—	—		$-(CH_2)_7-C_6H_4-Si(OMe)_3$
202	0			—	—		$-(CH_2)_7-C_6H_4-Si(OMe)_3$
203	0			—	—		$-(CH_2)_4-Si(OMe)_3$































【0079】

【表21】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
204	0			—	—		$-\text{CH}=\text{CH}-\text{Si}(\text{OMe})_3$
205	0			—	—		$-\text{CH}=\text{CH}-\text{CH}_2-\text{Si}(\text{OMe})_2\text{Me}$
206	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
207	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_3-\text{SiMe}_2(\text{OMe})_2$
208	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_2-\text{SiMe}_2(\text{OMe})$
209	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_3-\text{Si}(\text{OEt})_3$
210	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_{10}-\text{Si}(\text{OMe})_3$
211	0			—	—		$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-\text{Si}(\text{OMe})_3$
212	0			—	—		$-\text{CH}=\text{CH}-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{OMe})_3$
213	0			—	—		$-\text{CH}=\text{CH}-(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$

【0080】

【表 2 2】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
214	0			—	—		$-\text{CH}=\text{N}(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
215	0			—	—		$-\text{CH}=\text{N}(\text{CH}_2)_3$ $-\text{Si}(\text{OEt})_3$
216	0			—	—		$-\text{CH}=\text{N}-\text{CH}_2$ $-\text{Si}(\text{OMe})_2\text{Me}$
217	0			—	—		$-\text{CH}=\text{N}-\text{C}_6\text{H}_4-$ $(\text{CH}_2)_3-\text{Si}(\text{OMe})_3$
218	0			—	—		$-\text{CH}=\text{N}(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
219	0			—	—		$-\text{O}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
220	0			—	—		$-\text{O}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_2\text{Me}$
221	0			—	—		$-\text{O}-(\text{CH}_2)_3$ $-\text{Si}(\text{OEt})_3$
222	0			—	—		$-\text{CH}_2-\text{O}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_3$
223	0			—	—		$-(\text{CH}_2)_3-\text{O}-(\text{CH}_2)_3$ $-\text{Si}(\text{OMe})_2\text{Me}$

【0081】

【表23】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
224	1						$-(CH_2)_4-Si(OMe)_3$
225	1						$-(CH_2)_3-Si(OEt)_3$
226	1						$-CH_2CH_2-(CH_2)_2-Si(OMe)_3$
227	1						$-CH_2CH_2-(CH_2)_2-Si(OMe)_3$
228	1						$-CH_2CH_2CH_2-Si(OMe)_2Me$
229	1						$-CH_2CH_2C_6H_4-Si(OMe)_3$
230	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
231	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
232	1						$-CH=CH-(CH_2)_2-Si(OMe)_3$
233	1						$-CH=CH-CH_2-Si(OMe)_2Me$
234	1						$-CH=CH-C_6H_4-Si(OMe)_3$

【0082】

【表24】

化合物	k	Ar ¹	Ar ²	Ar ³	Ar ⁴	Ar ⁵	X
2 3 5	1						$\text{-CH=N(CH}_2)_3$ -Si(OMe)_3
2 3 6	1						$\text{-CH=N(CH}_2)_3$ -Si(OMe)_3
2 3 7	1						$\text{-CH=N(CH}_2)_3$ -Si(OMe)_3
2 3 8	1						-CH=N-CH_2 $\text{-Si(OMe)}_3\text{Me}$
2 3 9	1						$\text{-CH=N-C}_6\text{H}_4$ $(\text{CH}_2)_3\text{-Si(OMe)}_3$
2 4 0	1						$\text{-O(CH}_2)_3$ -Si(OMe)_3
2 4 1	1						$\text{-O(CH}_2)_3$ -Si(OEt)_3
2 4 2	1						$\text{-CH}_2\text{-O(CH}_2)_3$ -Si(OMe)_3
2 4 3	1						$\text{-CH}_2\text{-O(CH}_2)_3$ -SiOEt_3
2 4 4	1						$(\text{CH}_2)_3\text{-O(CH}_2)_3$ -Si(OMe)_3

【0083】

【表 25】

化合物	k	Ar ₁	Ar ₂	Ar ₃	Ar ₄	Ar ₅	X
245	0			—	—		$-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
246	0			—	—		$-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
247	0			—	—		$-\text{CH}_2-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
248	0			—	—		$-\text{CH}_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{O}i\text{Pr})_3$
249	0			—	—		$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
250	0			—	—		$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{O}i\text{Pr})_3$
251	1						$-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
252	1						$-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{O}i\text{Pr})_3$
253	1						$-\text{CH}_2-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
254	1						$-\text{CH}_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{O}i\text{Pr})_3$
255	1						$-(\text{CH}_2)_2-\text{COO}-(\text{CH}_2)_3-\text{Si}(\text{O}i\text{Pr})_3$
256	1						$-(\text{CH}_2)_2-\text{COO}-\text{CH}_2-\text{C}_6\text{H}_4-(\text{CH}_2)_2-\text{Si}(\text{O}i\text{Pr})_3$

【0084】本発明の感光層に用いられる一般式（I）表される化合物の含有量は1～100重量%の範囲で用いることができるが、好ましくは10～90重量%、さらに好ましくは40～60重量%とするのが好ましい。

【0085】本発明において、感光層に用いられるフッ素含有化合物は、感光体表面に対するトナーや紙粉などの付着を防止する効果を有するものであり、トリフルオロエチレン、テトラフルオロエチレン、フッ化ビニル、フッ化ブニリデン等のフッ素含有樹脂またはその微粒子を用いることができる。

【0086】本発明の感光層に用いられるフッ素含有化合物のなかでも特に好適なのは、アルコキシシラン基やシラノール基等を有する、一般式（I）で表される化合物におけるGで表される無機ガラス質ネットワークサブグループを介して架橋反応可能な化合物であり、これらを用いることで、フッ素含有化合物と一般式（I）で表される化合物とが感光層中で架橋構造の少なくとも一部を形成し、フッ素含有化合物を含有させることによる

機械的強度の低下が少なくなるため好適である。アルコキシシラン基やシラノール基等を有するフッ素含有化合物としては、（トリデカフルオロ 1, 1, 2, 2-テトラヒドロオクチル）トリエトキシシラン、（3, 3, 3-トリフルオロプロピル）トリメトキシシラン、3-（ヘプタフルオロイソプロポキシ）プロピルトリエトキシシラン、1H, 1H, 2H, 2H-パーフルオロアルキルトリエトキシシラン、1H, 1H, 2H, 2H-パーフルオロデシルトリエトキシシラン、1H, 1H, 2H, 2H-パーフルオロオクチルトリエトキシシラン、等が挙げられる。

【0087】本発明の感光層に用いられるフッ素含有化合物の添加量は、添加する層において15重量%以下とすることが望ましいが、一般式（I）で表される化合物と架橋可能なものである場合、40重量%程度添加することも可能である。

【0088】本発明において、感光層に用いられる酸化防止剤は、帯電器で発生するオゾン等の酸化性ガスによ

る劣化を防止する目的で添加される。感光体表面の機械的強度を高めると感光体が酸化性ガスにより長い間接触することになるため、従来より強い耐性が要求される。そこで、本発明の電子写真感光体では、一般式（I）で表される化合物におけるFで表される光電特性サブユニットの構造として耐酸化性のあるものを用いることに加えて、酸化防止剤を添加することによって高い耐酸化性を持つものとなる。酸化防止剤としては、ヒンダードフェノール系あるいはヒンダードアミン系が好ましいが、有機イオウ系酸化防止剤、フォスファイト系酸化防止剤、ジチオカルバミン酸塩系酸化防止剤、チオウレア系酸化防止剤、ベンズイミダゾール系酸化防止剤、などの公知の酸化防止剤を用いてもよい。ヒンダードフェノール系酸化防止剤としては、2, 6-ジ-*t*-ブチル-4-メチルフェノール、2, 5-ジ-*t*-ブチルヒドロキノン、N, N'-ヘキサメチレンビス（3, 5-ジ-*t*-ブチル-4-ヒドロキシヒドロシナマイド、3, 5-ジ-*t*-ブチル-4-ヒドロキシ-ベンジルフォスフォネートジエチルエステル、2, 4-ビス〔（オクチルチオ）メチル〕-*o*-クレゾール、2, 6-ジ-*t*-ブチル-4-エチルフェノール、2, 2'-メチレンビス（4-メチル-6-*t*-ブチルフェノール）、2, 2'-メチレンビス（4-エチル-6-*t*-ブチルフェノール）、4, 4'-ブチリデンビス（3-メチル-6-*t*-ブチルフェノール）、2, 5-ジ-*t*-アミルヒドロキノン、2-*t*-ブチル-6-（3-ブチル-2-ヒドロキシ-5-メチルベンジル）-4-メチルフェニルアクリレート、4, 4'-ブチリデンビス（3-メチル-6-*t*-ブチルフェノール）、などが挙げられる。

【0089】本発明に感光層に用いられる酸化防止剤は、一般式（I）で表される化合物およびフッ素含有化合物を含有する表面保護層に、同時に含有するのが、最も好ましい形態である。しかし、帯電部材で発生するオゾンやNO_xガスは、感光体の表面のみだけではなく、量は少ないものの、下層の電荷発生層や電荷輸送層といった感光層まで浸透して、酸化劣化を引き起こす。よって、感光体全体の耐酸化性を向上させるため、一般式（I）で表される化合物を含有しない層にも酸化防止剤を添加することが好ましい。

【0090】本発明の感光層に用いられる酸化防止剤の添加量としては、いずれの層に添加する場合でも、各層の15重量%以下が好ましく、10重量%以下がさらに好ましい。15重量%を超えると、機械的強度の低下、光電特性の低下等の弊害が生じてしまう。

【0091】一般式（I）表される化合物、フッ素含有化合物及び酸化防止剤を含有する架橋膜を形成する場合、一般式（I）表される化合物は単独で架橋反応可能であり、架橋硬化膜を形成することができる。しかし、表面性や強度などの膜特性を良好にするためには、一般式（I）表される化合物におけるGで表される無機ガラ

ス質ネットワークサブグループを介して結合しうる他の硬化性化合物を同時に用いることが望ましい。

【0092】一般式（I）で表される化合物の具体例として、一般式（II）で表される化合物を選んだ場合に、膜形成のために併用する硬化性化合物としては、シリコンハードコートなどとして公知の硬化性シロキサン樹脂を用いることができる。具体的には、複数のシラノール基を有する有機系シロキサン樹脂、アルコキシシラン、シランカップリング剤、およびそれらの混合物、などを用いることができる。

【0093】本発明においては、必要に応じてこの感光層中に、所望の特性を得るために、前記必須成分の他、公知の添加剤、例えば、シリコンオイル等のレベリング剤等を感光層に含有させてもよい。

【0094】本発明において、感光層に用いられる一般式（I）表される化合物、フッ素含有化合物及び酸化防止剤は、感光体表面の傷や摩耗による劣化の防止、感光体表面に対するトナーや紙粉の付着を防止、および感光体表面の帯電プロセスで発生するオゾン等の酸化性ガスによる劣化の防止する観点から、感光層の最表面にある層に含有されるのが好ましい。例えば、感光層の最表面に表面保護層を有する構造の場合、その表面保護層にこれらの化合物を含有させるのが好ましく、その下地となる感光層としては従来から公知のものを用いることができる。この感光層を有する感光体の層構造は任意であり、電荷発生層と電荷輸送層を積層した積層型でもよいし、電荷発生材料を含有する単層型でもよい。また、感光層が積層型である場合で、電荷輸送層が最表面層であるときには電荷輸送層に、電荷発生層が最表面層である時には電荷発生層に、一般式（I）で表される化合物、フッ素含有化合物及び酸化防止剤を含有させるのが好ましい。さらにまた、感光層が単層型の場合、その中に電荷発生材料等と共に、一般式（I）で表される化合物、フッ素含有化合物及び酸化防止剤を含有させて用いることができる。

【0095】本発明において、感光層に表面保護層を設ける場合、一般式（I）で表される化合物、フッ素含有化合物及び酸化防止剤は表面保護層に含有するのが好ましいのは前述の通りであるが、表面保護層を形成するには、一般式（I）で表される化合物、フッ素含有化合物及び酸化防止剤と共に、必用に応じて、前記記載の硬化性化合物である硬化性シロキサン樹脂等に、溶剤等を必要に応じて混合した塗液を調製し、感光層上に塗布した後、加熱することにより架橋硬化させるのが、表面強度の観点から好ましい。

【0096】本発明において表面保護層の形成に用いられる溶剤は、液粘度調整等のために添加されるものであり、用いられる溶剤としては、メタノール、エタノール、*n*-プロパノール、*n*-ブタノール、ベンジルアルコール、メチルセロソルブ、エチルセロソルブ、アセトン、

メチルエチルケトン、シクロヘキサノン、酢酸メチル、酢酸 *n*-ブチル、ジオキサン、テトラヒドロフラン、メチレンクロライド、クロロホルム等の通常の有機溶剤が挙げられ、これらを単独あるいは2種以上混合して用いることができる。

【0097】本発明の表面保護層の形成において、架橋硬化反応を行う際には、無触媒で行なってもよいが、適切な触媒を用いてもよい。触媒としては、塩酸、硫酸、蟻酸、酢酸、トリフルオロ酢酸、等の酸触媒、アンモニア、トリエチルアミン等の塩基、ジブチル錫ジアセテート、ジブチル錫ジオクトエート、オクエ酸第一錫等の有機錫化合物、テトラ-*n*-ブチルチタネート、テトライソプロピルチタネート等の有機チタン化合物、有機カルボン酸の鉄塩、マンガン塩、コバルト塩、亜鉛塩、ジルコニウム塩等が挙げられる。また、硬化反応の際の温度は特に制限はないが、好ましくは、室温～150度に設定する。

【0098】本発明において、一般式(I)で表される化合物、フッ素含有化合物及び酸化防止剤を含有する表面保護層の塗布方法としては、ブレードコーティング法、マイヤーバーコーティング法、スプレーコーティング法、浸漬コーティング法、ビードコーティング法、エアナイフコーティング法、カーテンコーティング法等の通常の方法を用いることができる。表面保護層の膜厚は、1～10 μm 程度とするのが好ましい。

【0099】本発明において、積層型感光層を採用する場合、それを構成する電荷発生層は、電荷発生材料および結着樹脂を含有し、電荷発生層には、必用に応じて、レベリング剤(表面の平滑化)、カップリング剤(密着性向上)、等公知の添加剤を添加してもよい。

【0100】本発明の電荷発生層に用いられる電荷発生材料としては、非晶質セレン、結晶性セレン-テルル合金、セレン-ヒ素合金、その他セレン化合物およびセレン合金、酸化亜鉛、酸化チタン等の無機系光導電性材料、フタロシアニン系、スクアリリウム系、アントラントロン系、ペリレン系、アゾ系、アントラキノ系、ピレン系、ピリリウム塩、チアピリリウム塩等の有機顔料および染料が用いられる。その中でもフタロシアニン系化合物は光感度が高いので特に適しており、無金属フタロシアニン、オキシチタニウムフタロシアニン、ハロゲン化ガリウムフタロシアニン、ヒドロキシガリウムフタロシアニン、ハロゲン化錫フタロシアニンが好ましい。特に、X線回折スペクトルにおけるブラッグ角 ($2\theta \pm 0.2^\circ$) が、 7.4° 、 16.6° 、 25.5° 、 28.3° に強い回折ピークを持つ特定の結晶形を有するクロロガリウムフタロシアニン、あるいはX線回折スペクトルにおけるブラッグ角 ($2\theta \pm 0.2^\circ$) が、 7.5° 、 9.9° 、 12.5° 、 16.3° 、 18.6° 、 25.1° 、 28.3° に強い回折ピークを持つ特定の結晶形を有するヒドロキシガリウムフタ

シアニンは、可視光から近赤外光の広い領域の光に対して高い電荷発生効率を有しており、特に好ましいものである。

【0101】本発明の電荷発生層に用いられる結着樹脂としては、ポリビニルブチラル樹脂、ポリビニルホルマール樹脂、部分変性ポリビニルアセタール樹脂、ポリカーボネート樹脂、ポリエステル樹脂、アクリル樹脂、ポリ塩化ビニル樹脂、ポリスチレン樹脂、ポリビニルアセテート樹脂、塩化ビニル-酢酸ビニル共重合体、シリコン樹脂、フェノール樹脂、ポリ-N-ビニルカルバゾール樹脂等であるがこれらに限定されるものではない。これらの結着樹脂は、単独あるいは2種以上混合して用いることができる。本発明の電荷発生層に用いられる電荷発生材料と結着樹脂との配合比(重量比)は、10:1～1:10の範囲が好ましい。

【0102】本発明の電荷発生層を塗布するのに用いる溶剤としては、メタノール、エタノール、*n*-プロパノール、*n*-ブタノール、ベンジルアルコール、メチルセロソルブ、エチルセロソルブ、アセトン、メチルエチルケトン、シクロヘキサノン、酢酸メチル、酢酸 *n*-ブチル、ジオキサン、テトラヒドロフラン、メチレンクロライド、クロロホルム等の通常の有機溶剤が挙げられ、これらを単独あるいは2種以上混合して用いることができる。本発明において、電荷発生層の膜厚は、一般的には、0.1～5 μm 、好ましくは0.2～2.0 μm が適当である。

【0103】本発明において、電荷発生層の塗布方法としては、ブレードコーティング法、マイヤーバーコーティング法、スプレーコーティング法、浸漬コーティング法、ビードコーティング法、エアナイフコーティング法、カーテンコーティング法等の通常の方法を用いることができる。

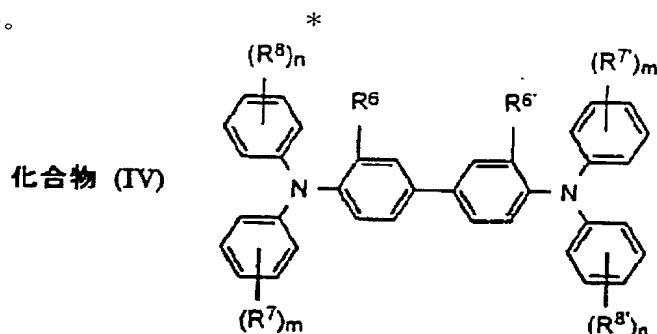
【0104】本発明において、積層型感光層における電荷輸送層は、電荷輸送材料と結着樹脂を含有し、あるいは高分子電荷輸送材料を含有する。

【0105】本発明の電荷輸送層に用いられる電荷輸送材料としては、*p*-ベンゾキノ、クロラニル、ブロマニル、アントラキノ等のキノ系化合物、テトラシアノキノジメタン系化合物、2,4,7-トリニトロフルオレノン等のフルオレノン化合物、キサントン系化合物、ベンゾフェノン系化合物、シアノビニル系化合物、エチレン系化合物等の電子吸引性物質、トリアリールアミン系化合物、ベンジジン系化合物、アリールアルカン系化合物、アリール置換エチレン系化合物、スチルベン系化合物、アントラセン系化合物、ヒドラゾン系化合物などがあげられる。これらの電荷輸送材料は単独または2種以上混合して用いることができる。特に、下記一般式(IV)で表されるベンジジン系化合物、および下記一般式(V)で表されるトリアリールアミン系化合物は、高い電荷(ホール)輸送能と優れた安定性を有して

いるため、特に好ましく用いることができる。それぞれの化合物例を表に示す。これらは、単独または2種以上混合して用いることができる。

*【0106】

【化20】



【0107】一般式 (IV) 中、 R^6 および $R^{6'}$ は、水素原子、ハロゲン原子、炭素数 1～5 のアルキル基、または炭素数が 1～5 のアルコキシ基を表し、同一であってもよく、異なってもよい。 R^7 、 $R^{7'}$ 、 R^8 および $R^{8'}$ は、水素原子、ハロゲン原子、炭素数 1～5 のアルキル基、炭素数が 1～5 のアルコキシ基、または炭素数 1～2 のアルキル基で置換された置換アミノ基を表し、同一であってもよく、異なってもよい。 m およ

【0109】一般式 (V) 中、 R^9 は、水素原子またはメチル基を表し、 n は 1 または 2 を表す。 Ar^6 および Ar^7 は、置換あるいは無置換のアリール基を表し、該置換基としては、ハロゲン原子、炭素数 1～5 のアルキル基または炭素数 1～5 のアルコキシ基、または炭素数 1～2 のアルキル基で置換された置換アミノ基を表す。

【0110】下記表 26 に、一般式 (IV) で表されるベンジジン系化合物の例示化合物「IV-1～IV-54」を、一般式 (IV) における具体的な官能基を示すことにより挙げるが、本発明は、これらに限られるものではない。

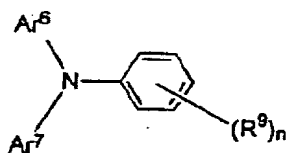
【0111】

【表 26】

【0108】

【化 21】

化合物(V)





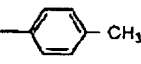

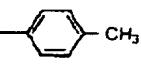
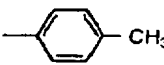
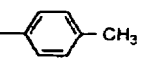
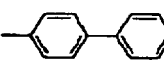
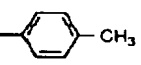
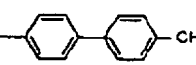
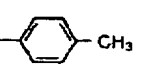
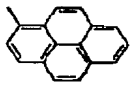
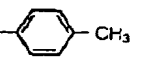
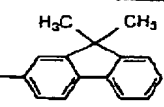
一般式(IV)の 例示化合物 No.	R ⁶ , R ^{6'}	(R ⁷) _m , (R ^{7'}) _m	(R ⁸) _n , (R ^{8'}) _n	一般式(IV)の 例示化合物 No.	R ⁶ , R ^{6'}	(R ⁷) _m , (R ^{7'}) _m	(R ⁸) _n , (R ^{8'}) _n
IV-1	CH ₃	H	H	IV-28	Cl	H	H
IV-2	CH ₃	2-CH ₃	H	IV-29	Cl	2-CH ₃	H
IV-3	CH ₃	3-CH ₃	H	IV-30	Cl	3-CH ₃	H
IV-4	CH ₃	4-CH ₃	H	IV-31	Cl	4-CH ₃	H
IV-5	CH ₃	4-CH ₃	2-CH ₃	IV-32	Cl	4-CH ₃	2-CH ₃
IV-6	CH ₃	4-CH ₃	3-CH ₃	IV-33	Cl	4-CH ₃	3-CH ₃
IV-7	CH ₃	4-CH ₃	4-CH ₃	IV-34	Cl	4-CH ₃	4-CH ₃
IV-8	CH ₃	3,4-CH ₃	H	IV-35	C ₂ H ₅	H	H
IV-9	CH ₃	3,4-CH ₃	3,4-CH ₃	IV-36	C ₂ H ₅	2-CH ₃	H
IV-10	CH ₃	4-C ₂ H ₅	H	IV-37	C ₂ H ₅	3-CH ₃	H
IV-11	CH ₃	4-C ₃ H ₇	H	IV-38	C ₂ H ₅	4-CH ₃	H
IV-12	CH ₃	4-C ₄ H ₉	H	IV-39	C ₂ H ₅	4-CH ₃	4-CH ₃
IV-13	CH ₃	4-C ₂ H ₅	2-CH ₃	IV-40	C ₂ H ₅	4-C ₂ H ₅	4-CH ₃
IV-14	CH ₃	4-C ₂ H ₅	3-CH ₃	IV-41	C ₂ H ₅	4-C ₃ H ₇	4-CH ₃
IV-15	CH ₃	4-C ₂ H ₅	4-CH ₃	IV-42	C ₂ H ₅	4-C ₄ H ₉	4-CH ₃
IV-16	CH ₃	4-C ₂ H ₅	3,4-CH ₃	IV-43	OCH ₃	H	H
IV-17	CH ₃	4-C ₃ H ₇	3-CH ₃	IV-44	OCH ₃	2-CH ₃	H
IV-18	CH ₃	4-C ₃ H ₇	4-CH ₃	IV-45	OCH ₃	3-CH ₃	H
IV-19	CH ₃	4-C ₄ H ₉	3-CH ₃	IV-46	OCH ₃	4-CH ₃	H
IV-20	CH ₃	4-C ₄ H ₉	4-CH ₃	IV-47	OCH ₃	4-CH ₃	4-CH ₃
IV-21	CH ₃	4-C ₂ H ₅	4-C ₂ H ₅	IV-48	OCH ₃	4-C ₂ H ₅	4-CH ₃
IV-22	CH ₃	4-C ₂ H ₅	4-OCH ₃	IV-49	OCH ₃	4-C ₃ H ₇	4-CH ₃
IV-23	CH ₃	4-C ₃ H ₇	4-C ₃ H ₇	IV-50	OCH ₃	4-C ₄ H ₉	4-CH ₃
IV-24	CH ₃	4-C ₃ H ₇	4-OCH ₃	IV-51	CH ₃	2-N(CH ₃) ₂	H
IV-25	CH ₃	4-C ₄ H ₉	4-C ₄ H ₉	IV-52	CH ₃	3-N(CH ₃) ₂	H
IV-26	CH ₃	4-C ₄ H ₉	4-OCH ₃	IV-53	CH ₃	4-N(CH ₃) ₂	H
IV-27	H	3-CH ₃	H	IV-54	CH ₃	4-Cl	H

【0112】下記表27～31に、一般式(V)で表されるトリアリールアミン系化合物の例示化合物「V-1～V-62」を、一般式(V)における具体的な官能基を示すことにより挙げるが、本発明は、これらに限られ

るものではない。

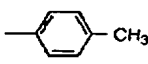
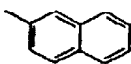
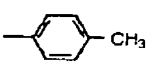
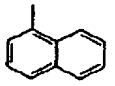

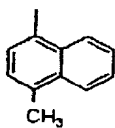
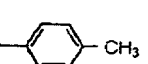
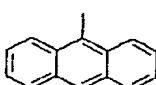
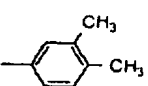
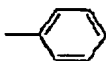
【0113】

【表27】

一般式(V)の例示化合物 No.	R ⁹	Ar ⁶	Ar ⁷
V-1	4-CH ₃		
V-2	3,4-CH ₃		
V-3	4-CH ₃		
V-4	3,4-CH ₃		
V-5	4-CH ₃		
V-6	3,4-CH ₃		
V-7	4-CH ₃		
V-8	3,4-CH ₃		
V-9	4-CH ₃		
V-10	3,4-CH ₃		
V-11	4-CH ₃		
V-12	3,4-CH ₃		
V-13	4-CH ₃		
V-14	3,4-CH ₃		

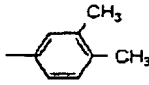
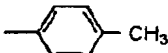
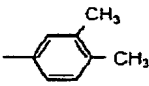
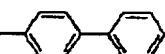
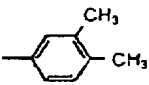
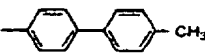
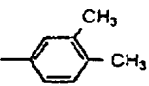
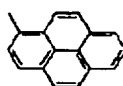
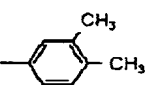
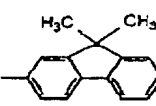
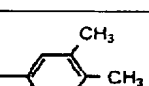
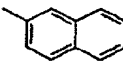
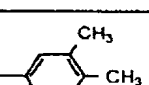
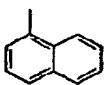
【0114】

* * 【表28】

一般式(V)の例示化合物 No.	R ⁹	Ar ⁶	Ar ⁷
V-15	4-CH ₃		
V-16	3,4-CH ₃		
V-17	4-CH ₃		
V-18	3,4-CH ₃		
V-19	4-CH ₃		
V-20	3,4-CH ₃		
V-21	4-CH ₃		
V-22	3,4-CH ₃		
V-23	4-CH ₃		
V-24	3,4-CH ₃		

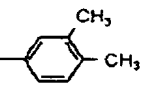
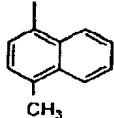
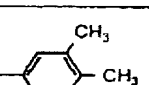
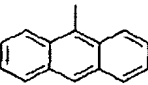
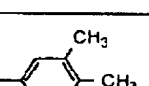
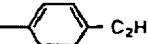
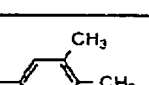
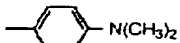
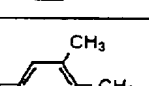

【0115】

【表29】

一般式 (V) の例示化合物 No.	R ⁹	Ar ⁶	Ar ⁷
V-25	4-CH ₃		
V-26	3,4-CH ₃		
V-27	4-CH ₃		
V-28	3,4-CH ₃		
V-29	4-CH ₃		
V-30	3,4-CH ₃		
V-31	4-CH ₃		
V-32	3,4-CH ₃		
V-33	4-CH ₃		
V-34	3,4-CH ₃		
V-35	4-CH ₃		
V-36	3,4-CH ₃		
V-37	4-CH ₃		
V-38	3,4-CH ₃		

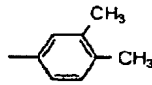
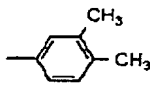
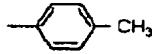

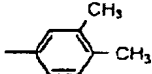

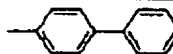

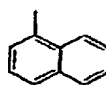

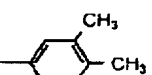
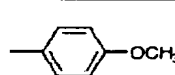
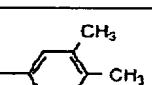
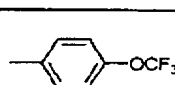
【 0 1 1 6 】

* * 【 表 3 0 】

一般式 (V) の例示化合物 No.	R ⁹	Ar ⁶	Ar ⁷
V-39	4-CH ₃		
V-40	3,4-CH ₃		
V-41	4-CH ₃		
V-42	3,4-CH ₃		
V-43	4-CH ₃		
V-44	3,4-CH ₃		
V-45	4-CH ₃		
V-46	3,4-CH ₃		
V-47	4-CH ₃		
V-46	3,4-CH ₃		

【 0 1 1 7 】

【 表 3 1 】

一般式 (V) の例示化合物 No.	R ⁶	Ar ⁶	Ar ⁷
V-49	4-CH ₃		
V-50	3, 4-CH ₃		
V-51	4-CH ₃		
V-52	3, 4-CH ₃		
V-53	4-CH ₃		
V-54	3, 4-CH ₃		
V-55	4-CH ₃		
V-56	3, 4-CH ₃		
V-57	4-CH ₃		
V-58	3, 4-CH ₃		
V-59	4-CH ₃		
V-60	3, 4-CH ₃		
V-61	4-CH ₃		
V-62	3, 4-CH ₃		

【0118】本発明の電荷輸送層に用いられる結着樹脂としては、ポリカーボネート樹脂、ポリエステル樹脂、メタクリル樹脂、アクリル樹脂、ポリ塩化ビニル樹脂、ポリ塩化ビニリデン樹脂、ポリスチレン樹脂、ポリビニルアセテート樹脂、スチレンーブタジエン共重合体、塩化ビニリデンーアクリロニトリル共重合体、塩化ビニルー酢酸ビニル共重合体、塩化ビニルー酢酸ビニルー無水マレイン酸共重合体、シリコン樹脂、シリコンーアルキッド樹脂、フェノールーホルムアルデヒド樹脂、スチレンーアクリル樹脂、スチレンーアルキッド樹脂、ポリーNービニルカルバゾール、ポリシランなどの公知の樹脂を用いることができる。

【0119】本発明の電荷輸送層に用いられる高分子電荷輸送材料としては、ポリーNービニルカルバゾール、ポリシランなどの電荷輸送性を有する公知のものを用いることができる。特に、特開平8-176293号公報や特開平8-208820号公報に示されているポリエステル系高分子電荷輸送材料は、高い電荷輸送性を有し

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【0120】本発明の電荷輸送層を塗布するのに用いられる溶剤としては、ベンゼン、トルエン、キシレン、クロロベンゼン等の芳香族炭化水素類、アセトン、2-ブタノン等のケトン類、塩化メチレン、クロロホルム、塩化エチレン等のハロゲン化脂肪族炭化水素類、テトラヒドロフラン、エチルエーテル、ジオキサン等の環状もしくは直鎖状のエーテル類、等の通常の有機溶剤が挙げられ、単独あるいは2種以上混合して用いることができる。

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【0121】本発明の電荷輸送層の塗布方法は、表面保護層や電荷発生層であげたものと同じ公知の方法を用いることができる。電荷輸送層の膜厚は5~50μmであり、好ましくは10~40μmである。

【0122】本発明において、電荷発生層および／または電荷輸送層には、帯電器で発生するオゾン等の酸化性ガスによる劣化を防止する目的で、酸化防止剤を添加してもよい。たとえ前記表面保護層があったとしても、酸化性ガスが表面保護層を透過して電荷発生層および／または電荷輸送層まで浸入することがあり、これによる酸化劣化を防止するためのものである。酸化防止剤としては、前記に挙げたものと同様のものを用いることができる。酸化防止剤の添加量としては電荷発生層および／または電荷輸送層の15重量%以下が望ましく、10重量%以下がさらに望ましい。

【0123】本発明において、単層型感光層は、電荷発生材料と結着樹脂とを含有し、必用に応じて、電荷輸送材料も含有させて形成される。電荷発生材料としては、前記電荷発生層に用いられる電荷発生材料と同様のものを用いることができる。結着樹脂としては、前記電荷発生層および電荷輸送層に用いられる結着樹脂と同様のものを用いることができる。また、溶剤としては、電荷発生層および電荷輸送層に用いられる溶剤と同様のものを用いることができる。

【0124】本発明の単層型感光層中の電荷発生材料の含有量は、10~85重量%程度、好ましくは20~50重量%とする。

【0125】本発明において、単層型感光層には、必要

に応じて電荷輸送材料を添加してもよい。電荷輸送材料としては、電荷輸送層に用いられる電荷輸送材料と同様のものを用いることができるが、その添加量は 5 ~ 5 0 重量%とすることが好ましい。さらに単層型感光層には、必要に応じて電荷輸送層の場合と同様の理由から酸化防止剤を添加してもよい。酸化防止剤としては、前記に挙げたものと同様なものを用いることができるが、その添加量は 1 5 重量%以下、好ましくは 1 0 重量%以下が良い。

【0 1 2 6】本発明の単層型感光層の塗布方法は、電荷発生層や電荷輸送層のところで述べたものと同様のものを用いることができる。膜厚は 5 ~ 5 0 μm 程度であり、1 0 ~ 4 0 μm とするのがさらに好ましい。

【0 1 2 7】本発明において、感光層に表面保護層をもうけない場合、一般式 (I) で表される化合物、フッ素含有化合物及び酸化防止剤は、前記積層型および単層型の最表面にある層に含有させるのが好ましい。具体的には、積層型の場合、電荷輸送層が表面であれば電荷輸送層に、電荷発生層が表面であれば電荷発生層に一般式

(I) 表される化合物、フッ素含有化合物及び酸化防止剤を含有させるのが好ましい。また、単層型の場合には、その中に電荷発生材料等と共に、一般式 (I) で表される化合物、フッ素含有化合物及び酸化防止剤を含有させることができる。一般式 (I) で表される化合物、フッ素含有化合物及び酸化防止剤を含有させた各々の層の塗布方法は、前記の各々の層の塗布方法と同様である。また、いずれの場合にも架橋硬化させるのが好ましく、架橋硬化反応は、前記保護層の場合と同様に行なうことができる。

【0 1 2 8】(画像形成装置) 本発明において、画像形成装置は、少なくとも、前述した電子写真感光体、およびその帯電手段ならびに機械的なクリーニング手段を有する電子写真方式の画像形成装置であり、かつ帯電手段が接触帯電方式であることを特徴とするものである。レーザー光学系や LED アレイなどの露光手段、トナーなどを用いて像を形成する現像手段、トナー像を紙などの媒体に写し取る転写手段、トナー像を紙などの媒体に定着させる定着手段、感光体表面に残留している静電潜像を除去する除電手段、機械的なクリーニング手段なども必要に応じて公知の方法で有してよい。機械的なクリーニング手段とは、感光体表面に直接接触し、表面に付着しているトナー、紙粉、ゴミなどを除去するものであり、ブレード、ブラシ、ロールなど公知のものを用いることができる。

【0 1 2 9】図 1 は本発明の画像形成装置の一例を示す概略構成図である。本発明の画像形成装置は、感光体 1 0、帯電ロール 1 2 による接触帯電器、レーザー露光光学系 1 4、粉体トナーを用いた現像器 1 6、転写用ロール 1 8、クリーニングブレード 2 0、定着ロール 2 2 を有している。また、「転写用ロール 1 8 とクリーニング

ブレード 2 0 との間には、除電用の光源 1 9 が配置されている。

【0 1 3 0】本発明の画像形成装置において、接触帯電方式は、感光体表面に接触させた導電性部材に電圧を印加することにより感光体表面を帯電させるものである。導電性部材の形状はブラシ状、ブレード状、ピン電極状、あるいはローラー状等何れでもよいが、特にローラー状部材が好ましい。通常、ローラー状部材は外側から抵抗層とそれらを支持する弾性層と芯材から構成される。さらに必要に応じて抵抗層の外側に保護層を設けることができる。

【0 1 3 1】本発明の導電性部材において、芯材の材質としては、導電性を有するもので、一般には鉄、銅、真鍮、ステンレス、アルミニウム、ニッケル等が用いられる。またその他導電性粒子等を分散した樹脂成形品等を用いることができる。

【0 1 3 2】本発明の導電性部材において、弾性層の材質としては、導電性あるいは半導電性を有するもので、一般にはゴム材に導電性粒子あるいは半導電性粒子を分散したものである。ゴム材としては E P D M、ポリブタジエン、天然ゴム、ポリイソブチレン、S B R、C R、N B R、シリコンゴム、ウレタンゴム、エピクロルヒドリンゴム、S B S、熱可塑性エラストマー、ノルボネンゴム、フロロシリコンゴム、エチレンオキシドゴム等が用いられる。

【0 1 3 3】本発明の導電性部材において、導電性粒子あるいは半導電性粒子としては、カーボンブラック、亜鉛、アルミニウム、銅、鉄、ニッケル、クロム、チタニウム等の金属、 $\text{ZnO}-\text{Al}_2\text{O}_3$ 、 $\text{SnO}_2-\text{Sb}_2\text{O}_3$ 、 $\text{In}_2\text{O}_3-\text{SnO}_2$ 、 $\text{ZnO}-\text{TiO}_2$ 、 $\text{MgO}-\text{Al}_2\text{O}_3$ 、 $\text{FeO}-\text{TiO}_2$ 、 TiO_2 、 SnO_2 、 Sb_2O_3 、 In_2O_3 、 ZnO 、 MgO 等の金属酸化物が用いることができ、これらの材料は単独あるいは 2 種以上混合して用いても良い。

【0 1 3 4】本発明の導電性部材において、抵抗層および保護層の材質としては結着樹脂に導電性粒子あるいは半導電性粒子を分散し、その抵抗を制御したもので、抵抗率としては $10^3 \sim 10^{14} \Omega \text{cm}$ 、好ましくは $10^5 \sim 10^{12} \Omega \text{cm}$ 、さらに好ましくは $10^7 \sim 10^{12} \Omega \text{cm}$ がよい。また膜厚としては 0. 0 1 ~ 1 0 0 0 μm 、好ましくは 0. 1 ~ 5 0 0 μm 、さらに好ましくは 0. 5 ~ 1 0 0 μm がよい。結着樹脂としてはアクリル樹脂、セルロース樹脂、ポリアミド樹脂、メトキシメチル化ナイロン、エトキシメチル化ナイロン、ポリウレタン樹脂、ポリカーボネート樹脂、ポリエステル樹脂、ポリエチレン樹脂、ポリビニル樹脂、ポリアリレート樹脂、ポリチオフェン樹脂、P F A、F E P、P E T等のポリオレフィン樹脂、スチレンブタジエン樹脂等が用いられる。導電性粒子あるいは半導電性粒子としては弾性層と同様のカーボンブラック、金属、金属酸化物が用いら

れる。また必要に応じてヒンダードフェノール、ヒンダードアミン等の酸化防止剤、クレー、カオリン等の充填剤や、シリコンオイル等の潤滑剤を添加することができる。

【0135】本発明の導電性部材において、これらの層を形成する手段としてはブレードコーティング法、マイヤーバーコーティング法、スプレーコーティング法、浸漬コーティング法、ビードコーティング法、エアナイフコーティング法、カーテンコーティング法等を用いることができる。

【0136】これらの導電性部材を用いて感光体を帯電させる方法としては、導電性部材に電圧を印加するが、印加電圧は直流電圧、あるいは直流電圧に交流電圧を重ねたものが好ましい。電圧の範囲としては、直流電圧は要求される感光体帯電電位に応じて正または負の50～2000Vが好ましく、特に100～1500Vが好ましい。交流電圧を重ねる場合は、ピーク間電圧が400～1800V、好ましくは800～1600V、さらに好ましくは1200～1600Vが好ましい。交流電圧の周波数は50～20,000Hz、好ましくは100～5,000Hzである。

【0137】

【実施例】以下に本発明の実施例を示すが、本発明はこれらの実施例に何ら限定されるものではない。なお、以下の実施例及び比較例における「部」は、重量部を意味する。

【0138】（実施例1）

ー下引層の形成ー

ホーニング処理を施したアルミニウムパイプ（外径30mm）基体上に、ジルコニウム化合物（商品名：「オルガノチックスZC540」、マツモト製薬社製）10部およびシラン化合物（商品名：「A1110」、日本ユニカー社製）1部とイソプロパノール40部およびブタノール20部からなる溶液を浸漬コーティング法で塗布し、150℃において10分間加熱乾燥し膜厚0.1μmの下引層を形成した。

【0139】ー電荷発生層の形成ー

X線回折スペクトルにおけるブラッグ角（ $2\theta \pm 0.2^\circ$ ）が、 7.4° 、 16.6° 、 25.5° 、 28.3° に強い回折ピークを持つクロロガリウムフタロシアニンの1部をポリビニルブチラール（商品名：「エスレックBM-S」、積水化学社製）1部、および酢酸n-ブチル100部と混合し、ガラスビーズとともにペイントシェーカーで1時間処理して分散した後、得られた塗布液を前記下引き層上にディップコートし、100℃で10分間加熱乾燥して膜厚約0.15μmの電荷発生層を形成した。

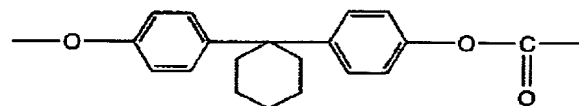
【0140】ー電荷輸送層の形成ー

例示化合物（IV-27）のベンジジン化合物2部、下記基本単位（VI）で示される高分子化合物（粘度平均

分子量 39,000）3部をクロロベンゼン20部に溶解させた塗布液を前記電荷発生層上に浸漬コーティング法で塗布し、110℃、40分の加熱を行なって膜厚20μmの電荷輸送層を形成した。

【0141】

【化22】



基本単位(VI)

【0142】ー表面保護層の形成ー

例示化合物（化合物145）10部、硬化性シロキサン樹脂（信越シリコン、X-40-2239）20部、フェニルトリエトキシシラン3部、フッ素含有シランカップリング剤（商品名：「KBM-7803」、信越シリコン社製）2部、ヒンダードフェノール系酸化防止剤（商品名：「MDP-S」、スミライザー社製）1部、酢酸1部、を混合して得られた塗布液を、前記電荷輸送層上にスプレー塗布し、30分の指触乾燥の後、120℃、60分の加熱処理を行ない、膜厚5μmの表面保護層を形成した。以上のようにして、実施例1の電子写真感光体を作製した。

【0143】（実施例2～7）実施例1の表面保護層において、例示化合物（化合物145）の代わりに、それぞれ、（化合物3）、（化合物13）、（化合物31）、（化合物155）、（化合物178）、（化合物255）、を用いた他は実施例1と全く同様にして電子写真感光体を作製し、それぞれ実施例2、3、4、5、6、及び7とした。

【0144】（実施例8）

ー下引層の形成ー

実施例1と同様にしてアルミパイプ（30mm）上に下引層を形成した。

【0145】ー電荷発生層の形成ー

実施例1におけるクロロガリウムフタロシアニンのかわりに、X線回折スペクトルにおけるブラッグ角（ $2\theta \pm 0.2^\circ$ ）が 7.5° 、 9.9° 、 12.5° 、 16.3° 、 18.6° 、 25.1° 、 28.3° に強い回折ピークを持つ特定の結晶形を有するヒドロキシガリウムフタロシアニンを用いた以外は同様にして電荷発生層を形成した。

【0146】ー電荷輸送層の形成ー

例示化合物（IV-27）2部、例示化合物（V-28）1部、前記基本単位（VI）で示される高分子化合物（粘度平均分子量39,000）3部をクロロベンゼン24部に溶解させた塗布液を前記電荷発生層上に浸漬コーティング法で塗布し、110℃、40分の加熱を行なって膜厚20μmの電荷輸送層を形成した。

【0147】—表面保護層の形成—

実施例1と同様にして表面保護層を形成した。以上のよう
に実施例8の電子写真感光体を作製した。

【0148】（実施例9～12）実施例8の表面保護層
において、例示化合物（化合物145）の代わりに、
（化合物9）、（化合物10）、（化合物149）、
（化合物150）を用いた以外は実施例8と同様にして
電子写真感光体を作製し、それぞれ実施例9～12とし
た

【0149】（実施例13）

—下引層の形成—

実施例1と同様にしてアルミパイプ（30mm）上に下
引層を形成した。

—電荷発生層の形成—

実施例1におけるクロロガリウムフタロシアニンのかわ
りに、X線回折スペクトルにおけるブラッグ角（ 2θ
 $\pm 0.2^\circ$ ）が 7.5° 、 9.9° 、 12.5° 、 16.3° 、 18.6° 、 25.1° 、 28.3° に強い
回折ピークを持つ特定の結晶形を有するヒドロキシガリ
ウムフタロシアニンを用いた以外は同様にして電荷発生
層を形成した。

【0150】—電荷輸送層の形成—

ビンダードフェノール系酸化防止剤（商品名：「MDP
—S」、スミライザー社製）0.3部、例示化合物（I
V-27）2部、例示化合物（V-28）1部、前記基
本単位（VI）で示される高分子化合物（粘度平均分子
量39,000）3部をクロロベンゼン24部に溶解さ
せた塗布液を前記電荷発生層上に浸漬コーティング法で
塗布し、 110°C 、40分の加熱を行なって膜厚 $20\mu\text{m}$
の電荷輸送層を形成した。

【0151】—表面保護層の形成—

実施例1と同様にして表面保護層を形成した。以上のよ
うに実施例13の電子写真感光体を作製した。

【0152】（実施例14）実施例13の表面保護層に
おいて、例示化合物（化合物145）の代わりに、（化
合物225）を用いた以外は、実施例13と同様にし
て、電子写真感光体を作製した。

【0153】（比較例1）実施例1の電子写真感光体の
表面保護層の形成において、酸化防止剤を添加しないこ
と以外は同様にして電子写真感光体を作製した。

【0154】（比較例2）実施例1の電子写真感光体の
表面保護層の形成において、フッ素含有シランカップリ
ング剤を添加しないこと以外は同様にして電子写真感光
体を作製した。

【0155】（比較例3）実施例1と同様にして、アル
ミパイプ上に下引層、電荷発生層、電荷輸送層、を順次
形成し、表面保護層は形成せずに電子写真感光体を作製
した。

【0156】こうして得られた実施例1～14及び比較
例1～3の電子写真感光体を、富士ゼロックス製「L a
s e r P r e s s 4160の改造機」に装着し、耐刷
性テストを行なった。この「L a s e r P r e s s 4
160改造機」は、接触帯電用の帯電ロール、レーザー
露光光学系、トナー現像器、転写ロール、クリーニング
ブレード、定着ロールを有している。

【0157】耐刷性の評価は、5万枚の印刷前後におけ
る画質評価、および摩耗による感光体の膜厚減少量の評
価を行なった。なお、連続印刷の用紙としては酸性紙を
用い、常温常湿（約 20°C 、 $40\%\text{RH}$ ）環境で行なっ
た。さらに、画質評価は常温常湿に加え、高温高湿（約
 28°C 、 $85\%\text{RH}$ ）でも行なった。これらは、感光体
表面への紙粉の付着による画質劣化を検出しやすくなる
ための加速評価方法である。結果を表32に示す。

【0158】

【表32】

	画質評価				摩耗量 (μ m)
	初期		5万枚印刷後		
	常温常湿	高温高湿	常温常湿	高温高湿	
実施例1	良好	良好	良好	良好	0.8
実施例2	良好	良好	良好	良好	1.5
実施例3	良好	良好	良好	良好	1.0
実施例4	良好	良好	良好	良好	1.2
実施例5	良好	良好	良好	良好	0.8
実施例6	良好	良好	良好	良好	0.9
実施例7	良好	良好	良好	良好	1.2
実施例8	良好	良好	良好	良好	0.8
実施例9	良好	良好	良好	良好	2.0
実施例10	良好	良好	良好	良好	1.5
実施例11	良好	良好	良好	良好	0.9
実施例12	良好	良好	良好	良好	1.2
実施例13	良好	良好	良好	良好	0.8
実施例14	良好	良好	良好	良好	1.2
比較例1 (酸化防止剤なし)	良好	良好	良好	濃度むら発生	0.7
比較例2 (フッ素原子なし)	良好	良好	良好	濃度むらと 画像欠陥発生	0.75
比較例3 (表面保護層なし)	良好	良好	画像欠陥が 発生	画像ぼけ が発生	10.2

【0159】表32より、実施例1～14の電子写真感光体を用いた場合は、全ての試験で良好な印字品質（解像度、階調性）を有していた。比較例1の電子写真感光体は、試験後の高温高湿の画質評価において画像濃度ムラが発生していた。これは、帯電により発生するわずかなオゾンなどによって表面保護層が劣化を受けていることが原因であると予想される。比較例2の電子写真感光体を用いた場合、試験後の高温高湿の画質評価において画像濃度ムラおよび画像ながれ、画像ボケなどの画像欠陥が見られた。これは、タルクなどの紙粉が感光体表面に付着することにより表面抵抗が部分的に低下し、静電潜像に欠陥が生じたことによると考えられる。また、保護層を有しない比較例3は常温常湿の試験後においても画像欠陥が発生し、耐刷性におとることがわかった。

【0160】

【発明の効果】以上のように、本発明は、環境依存性がなく、および光電特性、機械的強度、酸化性ガスに対す

る耐性、および紙粉などの付着物に対する耐性等が高く、かつ高品質の画像を長期に渡り得ることができる耐刷性に優れた電子写真感光体、ならびにそれを用いた画像形成装置を提供することができる。

【図面の簡単な説明】

【図1】 本発明の感光体を組み込んだ画像形成装置の一態様を示す概略構成図である。

【符号の説明】

- 10 感光体
- 12 帯電ロール
- 14 レーザー露光光学系
- 16 現像器
- 18 転写用ロール
- 20 クリーニングブレード
- 22 定着用ロール

【図 1】

